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An Address

ON THE

INFLUENCE OF LEAD ON NORMAL AND ABNORMAL CELL-GROWTH

AND ON CERTAIN ORGANS.

Delivered before the North of England Obstetrical and Gynæcological Society on Dec. 21st, 1923.

BY W. BLAIR BELL, M.D., B.S. LOND.,

PRESIDENT OF THE SOCIETY; PROFESSOR OF GYNÆCOLOGY AND OBSTETRICS IN THE UNIVERSITY; GYNÆCOLOGICAL AND OBSTETRICAL SURGEON, ROYAL INFIRMARY, AND HONORARY DIRECTOR, CANCER RESEARCH FUND, LIVERPOOL.

(*With Illustrative Plates.*)

I KEENLY appreciate the sympathetic attitude adopted by the Council in asking me to take as the subject of my Presidential Address the history and progress of our researches concerning the influence of lead on cell growth and the related issues into which we have been drawn. The history of our work is spread over so long a period of time, and the investigations have now covered a field so wide, that I can do no more than give a short summary of what has been done and of what we are endeavouring to do.

EARLY IDEAS AND INVESTIGATIONS.

It is difficult to fix the precise date when I myself first became actively interested in the question of the arrest of cell growth, for no one can be long in practice without giving anxious thought to this problem, the practical outcome of the solution of which may be an indication of a method for the treatment of malignant neoplasms. I must have begun seriously to consider the question between the years 1905 and 1909, for a short while ago among some old papers concerning research work of that period I came across the following memorandum:

"To investigate the cancer problem, by attacking it from the following standpoint.

The ovum is implanted in the uterine wall by a proteolytic action on the part of the trophoblast; but once there, the proliferation of the cells of the chorionic villi effect its further fixation.

Now, normally these chorionic cells reach a certain stage and do not invade the uterus further, but in certain abnormal conditions chorion-epithelioma (cancer) follows; that is to say, there is an unrestrained action on the part of these cells. Why?

Well, in the first place there is no evidence to show that chorion-epithelioma ever occurs before the expulsion or death of the fœtus (as in vesicular mole); consequently, it is a fair supposition that the fœtal circulation controls the abnormal growth of these cells.

Usually, of course, death of the fœtus means death and separation of these cells, but in some cases it means increase in their growth and malignant invasion. This, however, rarely follows full-term pregnancy, so we may infer that with the growth of the fœtus the growing vitality of these cells is gradually decreased.

It is worth investigating, therefore, whether the blood of the full-term fœtus contains any body which will produce death of the chorionic cells and abortion . . ."

The last few sentences of the memorandum, which was written for my own edification and not for publication, have been omitted, as they bear only indirectly upon the present issue. The document is signed and dated Nov. 14th, 1909.

In a few words this note indicates the lines along which I proposed in the first instance to attack the problem. Incidentally, I may say that the nature of chorion epithelioma precluded my viewing the "parasitic theory" of the origin of malignant disease with favour. Adami[1] some years previously, but unknown to me at the time, had adopted a similar argument.

My early experiments consisted of attempts to isolate from the fœtus the substance that is responsible for the inhibition of the chorion epithelium. I failed entirely. Nevertheless, I think success along these lines with more modern methods and more technical skill than I possess may still be possible. Although I recognise how important a part may be played by the elusive influence of cell correlation, I cannot dissociate this from continued control along the lines of cell differentiation. Quite recently it has been shown that highly specialised tissue elements removed from that control and cultivated artificially undergo dedifferentiation—that is, revert to an embryonic type—and that the addition to the culture of normal connective tissue causes the dedifferentiated cells to resume differentiated growth.[2] It will be remembered that in the human subject the chorionic epithelium shows a gradual and natural tendency to disappear as the period of gestation advances; but that in the rabbit the epithelium of this fœtal membrane not only invades the maternal tissues, but also persists throughout pregnancy. The rabbit, therefore, is a suitable animal in all respects for experimental work on the lines indicated.

In the chorion epithelium of several orders of mammals, including Man, we find, then, cells which are essentially malignant; but, insomuch as they are part of the normal mechanism whereby propagation is effected, natural inhibitory or cell-coördinating factors elaborated by the somatic cells of the embryo, restrain further development of, and invasion by, the undifferentiated epithelium. In this phenomenon we are permitted, I hold, to view a demonstration by Nature of the underlying mechanism that not only ensures cell coördination, but also brings recalcitrant embryonic cells into harmony with the rest of the organism. Have we not here presented the obverse of the chain of events that makes possible malignant neoplasia?

Since the fœtal secretion that inhibits the chorion epithelium could not be identified, it seemed to me that it might be worth while to study the action of some readily-available abortifacient. Eventually, I decided to investigate the properties of lead which, as is well known, may cause abortion. I soon came to the conclusion that the generally supposed modes of action—namely, the production of placental hæmorrhage and uterine muscular contractions—are not the primary causes. Hæmorrhage *from* the placental site is common to all cases of abortion, and if the ovum be expelled this must be effected by contractions of the uterine musculature. I see no reason to doubt—and I shall produce histological evidence in support of this view—that during the early stages of gestation lead circulating in the maternal blood acts directly on the embryonic cells of the chorion epithelium. We have found that in the later stages of pregnancy in the rabbit lead can be recovered from the fœtus itself.

I did not confine my attention to the action of lead on the chorion only; I investigated also the toxic effects of the metal on the gonads. The ovary showed no easily recognisable change—at any rate at first—but in the testis we observed the gradual disappearance of spermatozoa (Figs. 1 and 2). Since, then, lead has a selective action on certain tissues—sex cells, blood cells, nerve cells, and embryonic cells—there must be something common to all which attracts the metal. Now, the tissues mentioned are the very structures in which phosphatides—especially lecithin—are found in abundance; and the same chemical fact appears to be true of the embryonic cells of malignant growths.[3] Thus a substantial working hypothesis was evolved.

During the early stages of the work we used in our experiments ionic solutions and preparations which were partly colloidal, and we found a considerable difference in toxicity between the two. Fifty cases of cancer were treated in the period between November, 1920, and November, 1922, with encouraging results in a certain number. A preliminary discussion of this work was published last year.[4]

PRESENT ARRANGEMENTS FOR LABORATORY RESEARCH AND CLINICAL INVESTIGATION.

Although a considerable amount of laboratory and clinical work had been conducted, and scientific confirmation of our ideas and work had been obtained prior to February, 1923, it was then that a great step forward was taken. At the invitation of Vice-Chancellor Adami a few business men met, and most generously undertook to form with certain surgeons a committee to finance and conduct the business side of the work.* A large annual grant, has been placed at our disposal for a limited period. This generosity has enabled us to have twelve free beds set aside for cases of malignant disease. Moreover, the large staff shown in the following list has been enrolled to work out the different problems that have arisen.

Present Staff.
(December, 1923.)

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Pathology.—E. E. Glynn (P), R. A. Hendry (P).
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Secretary: Edward Carey (P).
(H) = Honorary. (W) = Whole-time. (P) = Part-time.
In addition, there are two assistant secretaries and six whole-time laboratory assistants.

Regular meetings of the staff, or of the members concerned in some aspect or allied aspect of the subject, are held. Interim reports are issued from time to time from the different departments, and these are circulated. I need not deal further with the details of organisation; it is sufficient for me to state that the closest correlation and harmony exist, and that remarkable keenness prevails. It seems to us, indeed, that this coöperative system, in which experts in various branches of knowledge concentrate on the ramifications of a single issue, is an executive ideal too rarely realised. It has appealed, I know, to the great lay organisers on our committee.

In what follows it must be clearly recognised that most of the work accomplished has been concerned in clearing the ground, and, although almost entirely confirmatory of the original ideas and investigations, it must not be accepted as final. I shall give the general results now, and, at a later date, the different members of the staff will, it is hoped, publish in appropriate journals full accounts of the investigations with which they have been concerned. It is with the concurrence and assistance of the various members of the staff that I am able to present to-day this précis of our investigations in advance; and in doing so I would ask you to remember that only ten months have elapsed since the present organisation came into being.

GENERAL POISONOUS EFFECTS OF LEAD.

Since we are using lead therapeutically it has been a matter of the first importance that we should not only know the established facts about lead poisoning, but should also investigate certain points which have been doubtful or unknown. That lead is a poison need not be emphasised today; but it must not be supposed that this knowledge is recent. Galen, Aëtius, Palladius, Vitruvius, and Pliny, not to mention the compiler Paul of Ægina, were well acquainted with the ætiology and symptoms of lead poisoning. In 1767 Sir George Baker published an essay in which he traced the cause of "epidemial colic" in Devonshire to the use of lead in the construction of presses and cisterns for the preparation and storage of cyder. A century earlier it had been shown by German writers that the colic associated with the drinking of light wines was due to adulteration with litharge. In 1773 Thomas Houlston, physician to the Liverpool Royal Infirmary, published an essay on the Liverpool spa water, with "An appendix on the accidental use of lead." I am indebted to Mr. T. H. Bickerton for calling my attention to, and for lending me a copy of, this interesting pamphlet. I hope on some occasion in the near future to have the opportunity of dealing with the subject-matter of some of these early expositions.

The most commonly observed symptoms of lead poisoning, and those on which stress is laid in modern text-books of toxicology, are nervous lesions, intestinal colic, nephritis, anæmia, abortion and sterility. Our experience has taught us that the blood changes, with which I shall deal directly, are invariable, but that the avoidance of the more serious phases only is necessary with patients under treatment. Unfortunately, however, in the past we have observed encephalitis, optic atrophy, nephritis, heart block, and intestinal colic. The blue gum-line, not often seen in rabbits, and due, of course, to the formation of lead sulphide by the combination of lead with the sulphur in H_2S from decaying vegetable debris, has been of little practical service in the estimation of the degree of lead poisoning. We have been especially concerned in the study of differences in behaviour of ionic, partly ionic and partly colloidal, and completely colloidal preparations of lead. The physiological and toxic properties of each are being investigated, and the therapeutical dissimilarities noted. That these preparations do differ I shall exemplify presently. Clark[5] has recently drawn attention to, and righly condemned, the extravagant therapeutical claims made for "colloidal" preparations; but I have failed to discover in his writings any suggestion as to the probable mechanism whereby a *true colloidal* preparation may produce an effect.

EXPERIMENTS AND OBSERVATIONS CONCERNING THE TOXIC EFFECTS OF LEAD PREPARATIONS.

Dr. W. J. Dilling has been engaged in pharmacological—and, therefore, in certain physiological and toxicological—experiments concerning the action of lead on the heart, intestine, and uterus. These investigations are in an early or incomplete stage. It is possible that in dissimilar conditions and with solutions of different character and strength, other results may be obtained—results which will necessitate modifications and qualifications in respect of the following findings.

Heart.—1 c.cm. of a solution of lead acetate containing 10 per cent. of lead was injected into the peritoneal cavity of the frog, and continuous records were taken from the ventricle. The effects noted on the tracings were lowering of the tone and slowing of the rhythm due to prolongation of diastole and diminution of contractility. At the expiration of 45 minutes the heart muscle showed evidence of precipitation of albumin (lead albuminate)—a source of difficulty in regard to the interpretation of the action of lead on the tissues. At this stage the general tone was raised, the amplitude of contraction remaining constant for four minutes and then falling from weakening of systole. After 70 minutes a 2–1 heart block commenced. Subsequently there was a gradual slowing of the A.V. rhythm, without marked variation in tone or in amplitude of the ventricle, until the final stage when systole was diminished and cessation occurred in diastole. With slight variations the same phenomena were observed as the result of intraperitoneal injections of a preparation of lead iodide in a state partly colloidal, partly ionic. The interpretation of these results seems to be that the chief action of lead as a cardiac depressant lies in diminution of A.V. conductivity and in reduction of excitability of the rhythmogenic area. Dr. Dilling has made the very important observation that when the mechanism of the heart is deeply

* The members of the committee are: Mr. J. Arthur Smith (chairman), Mr. Rex Cohen (treasurer), Vice-Chancellor Adami, Colonel J. J. Shute, Mr. Crompton Wood, Mr. R. Wilson, Sir Robert Jones, Mr. F. T. Paul, with Mr. E. Carey as secretary.

affected by lead in the way indicated a weak solution of caffeine citrate restores the cardiac action to the normal. A preparation of lead in a completely colloidal state appears to have no action on the heart of the frog.

Intestine.—Experiments were conducted on the isolated intestine of the guineapig and rabbit. A piece of ileum was removed from a newly-killed animal and was suspended in Tyrode's nutrient medium at 38° C., and kept under a continuous stream of oxygen. So far the action of the partly colloidal, partly ionic preparation of lead iodide only has been tested. It was observed that instead of producing contractions lead causes relaxation and inhibition of peristalsis without interference with the vagus mechanism or the muscle. The action may, therefore, be located in the sympathetics or possibly in Auerbach's plexus. It is interesting to note that the actively-contracting intestinal muscle of the rabbit is more resistant to this effect than that of the guineapig.

Uterus.—Experiments were conducted on uterine muscle in the same circumstances and with the same material as in the case of intestinal muscle. It was found that the actively-contracting non-pregnant uterus of the guineapig is immediately inhibited. With a change of Tyrode's medium the contractions recommence. Similar results were obtained with the pregnant uterus. When uterine muscle contractions have been abolished by lead, adrenalin apparently has no effect; but pilocarpine produces characteristic tonic contractions.

Kidney.—Our clinical experience goes to show that after intravenous injections of saturnine preparations, lead may appear fairly early in the urine without any serious consequence following. The cessation of treatment leads to the disappearance of lead. If, however, the treatment be pushed, a fall in the daily quantity of urine excreted is noted, and this is usually associated with œdema of the ankles. A definite decrease in the amount of urine secreted is a grave danger sign; in animals—dogs under treatment for cancer, and experimental rabbits—anuria supervenes with cortical necrosis of the tubules (Fig. 3). It is interesting that with "lead nephritis" the amount of urine secreted may be decreased by one-half and contain an appreciable quantity of lead, without the appearance of albumin. This matter is under investigation. In the chronic form of lead nephritis the kidneys show interstitial fibrosis.

Blood.—The well-known basophil stippling together with hypochromasia and polychromasia of the red cells is of considerable diagnostic importance. The persistence of this phenomenon appears to be related to the natural tolerance of the individual and species of animal concerned: the variations are considerable. Men resist the toxic effects of this metal better than women, and adults than children; rabbits are much more immune than dogs and poultry.

The stippling usually commences at the periphery of the cell, but later may be found throughout; and, so far as we can judge, fine stipples precede the appearance of coarse. The nature of the stippling is unknown; some look upon it as a regenerative process, others as a degenerative. Whether we shall be able to solve the problem I do not know, but we have material enough for an extended study, which I hope may be seriously undertaken shortly. Poikilocytosis and anisocytosis are sometimes seen. The decrease in red cells and the increase in the mononuclear white cells are associated phenomena. Occasionally, nucleated erythrocytes appear at a late stage. Nevertheless, they may occur in young people without other evidence of poisoning. In figure 4 a general picture of the appearance of the blood cells is shown. Anæmia is the outcome of the disappearance of red cells and of the decrease in the hæmoglobin content so often to be observed. Moreover, we have reason to believe that the bone marrow itself may be attacked.

INFLUENCE OF LEAD ON NORMAL GROWTH.

I now come to a very important part of the subject, to which we have been alive from the commencement. I recall an occasion when discussing our work with Mr. F. T. Paul, whose wisdom in these matters is second to that of no one, he said "Can you arrest normal growth with lead? I have always believed that anything that is found to influence the growth of cancer will also influence normal cell-growth." I told him that I was even then conducting experiments on the subject.

Development of Hyacinth Bulbs.—Our first experiments concerned the growth of hyacinths, and these were carefully conducted on a large scale—about 100 bulbs were employed—by Mr. Patterson. The final results may be summarised as follows: The root growth—which, of course, precedes the floral development—was arrested in all cases in which the bulbs were in contact with solutions of normal or basic lead acetate in strengths varying from 1·0 to 0·000001 per cent. of lead (Fig. 5). In the stronger solutions the floral development, also, when it appeared, was stunted; but the weaker solutions (0·00001 and 0·000001 per cent. of lead), although arresting to some degree the root development, did not affect to any appreciable extent the growth of the leaves and flowers (Fig. 6). The white patches which appear in the photographs (Figs. 5 and 6) on the upper parts of the glass vessels containing 1·0 per cent. of lead acetate are due to deposits on the glass. Roots are absent except for one or two white root-spikes about one-eighth of an inch in length. Chemical examination by Mr. Patterson of bulbs some months after the flowers and leaves had withered revealed the presence of lead in them. It appears, then, that the root growth and, to a lesser extent, the floral development of hyacinths are arrested by solutions of lead acetate, and that the degree of arrest varies directly with the strength of the solution used. In this connexion a remarkably interesting observation has been made since this Address was delivered—namely, the bulbs, which were carefully dried and preserved after the flowers and leaves had withered last year (1923), when grown this year in unadulterated tap water present, so far as the root growth is concerned, exactly the same appearance as when grown in lead-adulterated water last year. We expect, therefore, again to observe stunting of the floral development when it appears from those bulbs which were immersed in solutions containing 1·0 per cent. of lead acetate last year.

Experiments conducted by Dr. Dilling in several directions have confirmed these findings.

Germination of Seeds.—The effect on germination of placing the seeds of mustard and cress on jute-covered corks floating on solutions of lead salts was tested. It was observed that solutions of lead acetate containing 0·1 per cent. of lead reduce the germination-rate by 20 per cent., but that the seeds which germinate subsequently grow well (Fig. 7). In the case of sunflower seeds it was, however, observed by Dr. Dilling that not only the rate of germination but also the subsequent growth of the plants was adversely affected. A solution containing 0·25 per cent. of lead reduces the germination rate 34 per cent. below that of the control, while the subsequent growth of the plant is slow and stunted. Solutions containing 0·5 per cent. of lead completely inhibit germination and growth.

Germination of Frogs' Eggs.—Next, investigations were conducted in regard to the effect of lead on the germination of frogs' eggs. Three females and one male were isolated in each of six single porcelain tanks. One lot was kept as a control. The water in the other five tanks was contaminated with lead in the proportions of 1–1000, 1–10,000, 1–20,000, 1–33,000 and 1–100,000 of lead acetate. In all cases copulation soon took place and eggs were deposited; the adult frogs were not obviously affected even after immersion for a period of three months. The eggs in the control tank germinated, but in none of the other tanks was

any change to be observed in the spawn. Further series of observations were made in regard to frogs' spawn laid in normal conditions. No germination occurred in the eggs when the spawn was placed in solutions of lead acetate similar in strength to those already mentioned. It appears, therefore, that solutions so weak as 1–100,000, if not weaker, will prevent the germination of frogs' eggs. Moreover, there was no evidence of the precipitation of lead albuminate in solutions in which the quantity of lead acetate was less than 1–20,000.

Growth of Tadpoles.—These experiments were continued by Dr. Dilling in regard to the growth of healthy tadpoles. Very young tadpoles with external gills were placed in fresh water containing lead acetate in the proportions of 1–1000, 1–5000, 1–10,000, 1–20,000, and 1–100,000. In all cases death resulted within 24 hours. A further series of experiments with more mature tadpoles with internal gills showed that *resistance to the poisonous effects of lead is directly related to the age of the tadpole* and that extremely weak solutions of lead acetate—that is, less than 1–100,000 which is the limit of safety—retard growth.* This action—namely, the arrest of growth—is well demonstrated by the use of partly colloidal solutions of lead. In figure 8 is shown the retardation of growth in the treated tadpole, in comparison with the control, by a partly colloidal preparation of lead iodide containing 0·2 per cent. of lead. I shall discuss the significance of these experiments on the inhibition of animal and vegetable germination and growth later. At the moment I would merely rivet attention on the fact that *the arrest of growth in animal and vegetable organisms is directly proportional to the capacity for, or power of, growth.* This, of course, implies a certain specificity of action. There is obviously a difference between the *killing* of tissues with the cessation of growth, and the *arrest* of growth in living organisms. Moreover, tissues appear to be permanently affected in respect of growth; for, although there be no evidence of continued lead poisoning, a child once poisoned remains stunted. Injured organs in the adult—unconnected with growth—show a definite tendency to complete recovery once the lead has been removed from the tissues in question.

There are, of course, many things that may influence germination and growth; heat and cold, electrical discharges, rays of various kinds, and chemical substances of different characters, such as acids and alkalis. Nevertheless, it must be borne in mind that a similar *effect* on growth does not necessarily signify a similarity of *action*, nor does similarity of action in this respect necessarily imply similarity of effect in the other conditions in which lead appears to have a specific action.

INFLUENCE OF LEAD ON THE CELLS CONCERNED IN THE IMPLANTATION OF THE OVUM.

I propose to discuss separately this important action of lead—a consideration of the possibility of which engaged my attention from the first, as I have already stated—for although, strictly speaking, the effect may be held to concern the arrest of the normal growth of embryonic cells, yet in this case we have to deal in part with the inhibition of undifferentiated cells rather than what may be called normal independent somatic development and growth of the living unit which I have just considered.

I shall, therefore, now deal with the abortifacient action of lead in those mammals in which actual invasion of the maternal tissues by the trophoblast of the ovum is seen. I have not been able to make comparative investigations with the ungulates, in which order of mammals there is apposition only of the chorion to the cotyledonary surfaces, because of laboratory limitations in regard to animals of so large a size. Yet, the action of lead on the ovum in the uterus of an ungulate would be interesting and informative, for we have always to decide whether abortion follows death of the embryo poisoned with lead, whether it be due to the action of lead on the chorionic epithelium, or whether both factors are concerned.

Although the abortifacient action of lead has long been known, careful studies of the site from which abortion has occurred are singularly few; indeed, I know of no complete series of observations other than our own. Legge and Goadby [6] assert that "From what is stated later with regard to the curious action of lead upon the blood, the mechanism of abortion is easily understood; it is probable that placental hæmorrhages are produced as in other organs of the body." Oliver [7] states that "lead causes abortion probably by acting upon the unstriped muscular fibre of the womb and inducing spasm. The poison also passes from the blood of the mother through the placenta to the fœtus in utero, and by killing the fœtus it thus indirectly brings about abortion."

I have already exposed the obvious pitfall in regard to hæmorrhage *from* the placental site. I may also state that in our animals in which abortion occurred as the result of two or three intravenous injections of colloidal lead there was no hæmorrhage *in* the placental site or elsewhere, no stippling of the blood, or any other evidence of lead poisoning. With regard to Sir Thomas Oliver's statement, Dr. Dilling has shown that preparations partly ionic, partly colloidal, and containing 0·2 per cent. of lead, cause inhibition,

* Owing to an oversight on my part the strengths of the ionic solutions used in the experiments concerning the germination of frogs' eggs and the growth of tadpoles were estimated in terms of lead acetate instead of lead, which constitutes 53·2 per cent. of lead acetate.

Descriptions of Illustrations on Special Plates.

FIG. 1.—Photomicrograph of a section of the testis of the normal rabbit. (× 250.)

FIG. 2.—Photomicrograph of a section of the testis of the rabbit after treatment with lead, showing the complete absence of spermatozoa and almost complete absence of spermatogonia. (× 250.)

FIG. 3.—Photomicrograph of section of the kidney of a dog poisoned by lead. There is necrosis of the cortical tubules. (× 62.)

FIG. 4.—Composite drawing to illustrate the changes that may be seen in the blood of a mammal poisoned by lead. Basophil stippling and nucleation of the erythrocytes is readily to be observed. There is also anisocytosis and poikilocytosis. (× 600.)

*FIG. 5.—Development of hyacinth bulbs, showing arrest of root growth resulting from contact with solutions of normal or basic lead acetate of various strengths.

*FIG. 6.—Development of hyacinth bulbs in contact with lead acetate solutions of various strengths. The root growths show graduated stunting, and in the strongest solution (1·0 per cent.) the floral development is also greatly arrested.

FIG. 9.—Section of the uterus of a rabbit, showing normal placental attachments on the tenth day after fertilisation. The dark area on the surface of the placental cotyledon marks the region of invasion by chorionic epithelium. (×3·3.)

FIG. 10.—Portion of the area of invasion of chorionic epithelium on the surface of the placental cotyledon under a higher magnification. (× 20.)

FIG. 11.—Section of the uterus of a rabbit which received three injections of colloidal lead (S_4) at intervals of two days from the eighth day after fertilisation. The placenta is clearly seen: and the white-ringed portion is shown under higher magnification in figure 12. (× 3·3.)

FIG. 12.—Portion of uterus and contents shown enclosed in a white ring in figure 11. (× 25.) D, Indicates the wall of the uterus apart from the placental site. Large decidual cells are to be seen in the upper portion. M, Maternal mucosa. P, Placenta which is degenerated. No chorionic epithelial cells are to be seen.

FIG. 13.—Section of the uterus of a rabbit which aborted between the eighth and sixteenth day after fertilisation, stained by Weigert's method. Fibrin is shown *within* the vessels only; there is none in the surrounding tissues, as would have been the case if hæmorrhage had occurred. (× 8.)

FIG. 14.—Section of the uterus with placental site of a rabbit 11 days after coitus. Two doses of colloidal lead had been given at intervals of three days from the third day. No fœtal remnant appears in the section. (× 8.)

FIG. 15.—Section of the uterus of a rabbit on thirteenth day after fertilisation, the animal having received three doses of colloidal lead at intervals of three days, commencing on third day after coitus. The placental site has almost recovered from the chorionic invasion. (× 8.)

* The deposit of lead carbonate on the glass vessels containing the strongest solution (1·0 per cent.) unfortunately prevents proper observation of the absence of root growth. (See text.)

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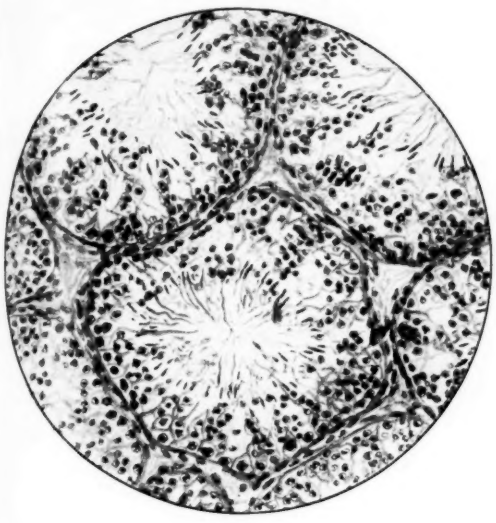

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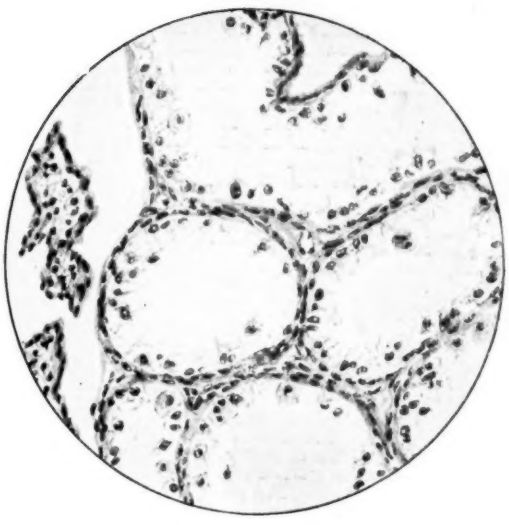

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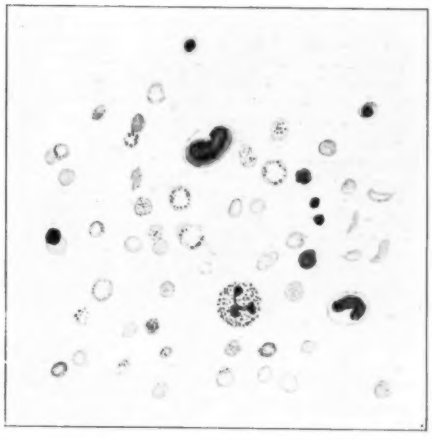

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PROF. BLAIR BELL: THE INFLUENCE OF LEAD ON CELL-GROWTH, ETC.

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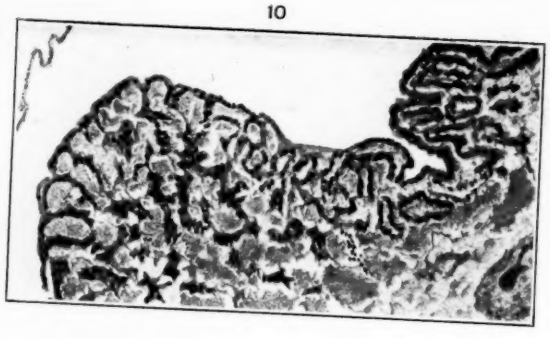

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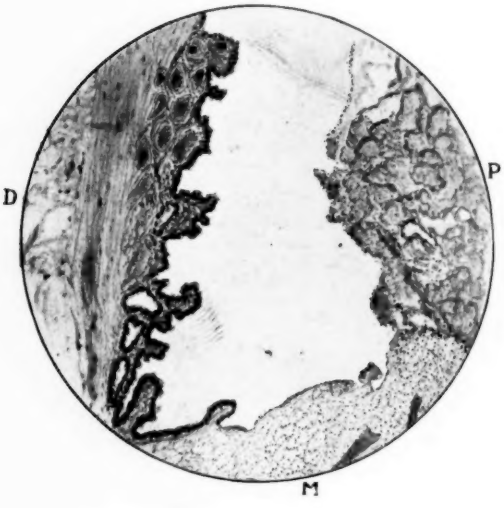

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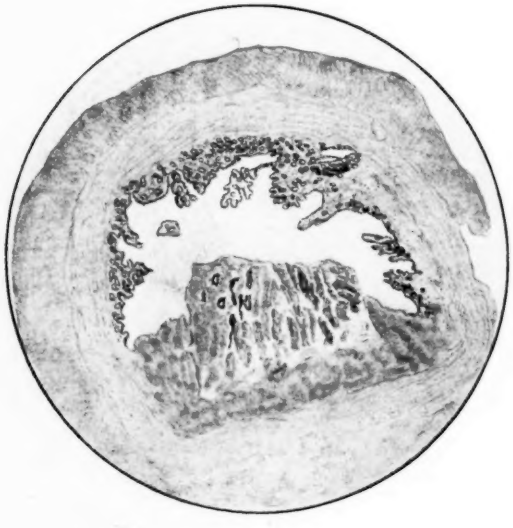

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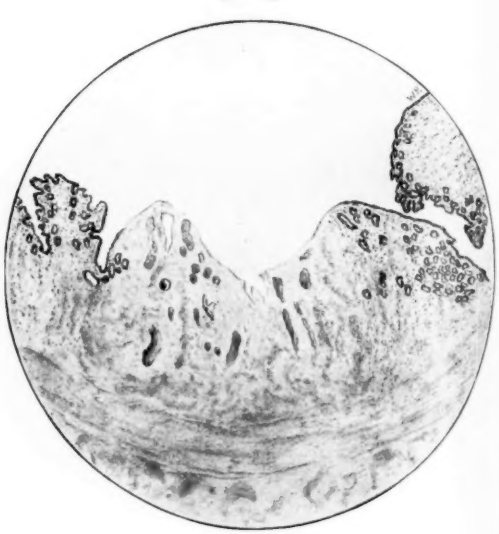

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not stimulation, of uterine contractions. The possibility of abortion following death of the fœtus from lead poisoning cannot be contested; but in our opinion lead can only kill the fœtus secondarily, having first attacked the chorionic epithelium.

So long ago as 1911 I made a collection of sections from the pregnant uteri of rabbits on different dates of gestation in order that I might compare the normal histological anatomy with the abnormal condition produced by lead. To understand the normal histological phenomena associated with pregnancy in the rabbit and correctly to appreciate and appraise the various alterations in the maternal mucosa and the developments in the fœtal membranes and their epithelial coverings, is not an easy task; and it would have been considerably more difficult had we not had the advantage of being able to study the previous work of Duval,[8] Chipman,[9] and others. This is not the place to recapitulate our difficulties and observations of the normal processes of gestation in the rabbit. It is sufficient for me to say that the fœtal epithelium in the early stages of pregnancy is sometimes better appreciated in its absence after abortion than by its presence in the maternal tissues. Dr. Annett has conducted the animal injection experiments that have yielded for investigation by Dr. Hendry the material so important to our research.

It is interesting to note that in our early investigations when we used solutions of lead in ionic state the animals that aborted were always deeply poisoned. Other observers, also, have found that pregnant rabbits, which were made to consume lead with their food, invariably died after abortion from lead poisoning.[10] I have made a similar observation in connexion with the purposeful production of abortion in the human subject by the selfadministration of lead. In our more recent experiments, however, Dr. Annett has found, as already stated, that by using lead in a true colloidal state abortion alone may be specifically produced. Animals in which abortion has been produced are sterile subsequently for a limited time only. In figures 9 and 10 are shown uteri with normal placental attachments in the rabbit on the tenth day after fertilisation. The darkly staining epithelium of the chorion is clearly seen invading superficially the cotyledon in connexion with which the placenta is formed. Figure 11 is an illustration of the uterus of a rabbit, which received three injections of colloidal lead at intervals of two days, from the eighth day after coitus. The animal was killed on what should have been the sixteenth day of gestation. The placenta is clearly seen, but histological examination (Fig. 12) reveals the fact that the chorionic epithelium has disappeared and that what remains is a degenerating mass of tissue. The maternal vessels are thrombosed (Fig. 13), and there is no evidence of "hæmorrhage." In figure 14 the uterus and placental site of a rabbit 11 days after coitus are shown. Two doses of colloidal lead had been given at intervals of three days from the third day. No fœtal remnant is to be seen in the section.

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FIG. 7.—Effects produced on the germination of mustard and cress seeds and on the subsequent development of the plant when grown on jute-covered corks floating on lead acetate solutions of various strengths.

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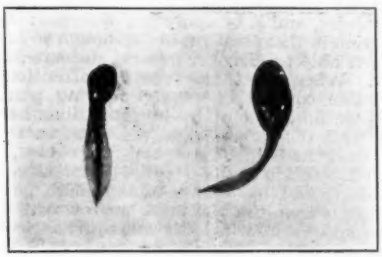

FIG. 8.—Retardation of growth in the tadpole (left) when treated with a partly colloidal preparation of lead iodide containing 0·2 per cent. of lead. The tadpole on the right is the normal control.

The uterus on the thirteenth day after fertilisation, illustrated in figure 15, is from a rabbit which received three doses of colloidal lead at intervals of three days commencing on the third day after coitus. In this case the placental site has almost recovered from the chorionic invasion; indeed, were there not other evidence of pregnancy, such as the decidual reaction on the opposite wall of the uterus, it would, perhaps, be a little difficult to establish the existence of recent pregnancy. As I have already stated, the animals gave no hæmatological or other evidence of lead poisoning. We are endeavouring to obtain material at various short intervals after single doses of colloidal lead. In all our present specimens the chorionic epithelium had been completely destroyed. We want now to study the actual process of destruction.

Although many toxins produce abortion by affecting the fœtus itself, I am unaware of any chemical substance that has an abortifacient action similar to that of lead. Experiments are, however, now being conducted in order that such metals as thorium, copper, and zinc may be tested. At present we have no evidence, clinical or otherwise, which suggests that abortion may be caused by poisoning with metallic compounds other than lead. On the other hand, we have ample clinical evidence that mercury and calcium salts do not do so.

DISCUSSION OF EXPERIMENTS CONCERNING GROWTH.

I am now in a position briefly to discuss and correlate the essential points which have been elucidated by the foregoing experiments in relation to germination and growth.

Germination is the earliest demonstration of growth; therefore the inhibition by lead of this phenomenon, whether it be in regard to eggs or seeds, is a matter of considerable importance. Although the actual chemical mechanism of the phosphatide-growth relationship has not been demonstrated, it is certain that such a relationship exists, and that eggs, seeds, and young growing tissues are rich in similar phosphatides, even though in varying degrees. Maclean[11]

states that "Although no reliable method for the estimation of plant phosphatides has as yet been evolved, the results recorded by different observers indicate that the leguminosæ are relatively rich in this substance, the dried seeds containing up to 1·5 per cent. or more of phosphatides. On the other hand, cereals generally contain much less, the amount present being roughly about 0·5 per cent."

It is common knowledge that the yolk of eggs contains a very large quantity of the various associated phosphatides, and it is highly probable that the ovum itself is rich in these substances, although so far I have only been able to discover general statements on the subject. When, next, we turn our attention to the phosphatide content of young growing plants and animals we find that many investigations have been made; and this is especially the case in regard to vertebrates, in which we are, of course, chiefly interested. Glikin [12] has paid special attention to the subject, and has shown that a high percentage of lecithin is found in the bone marrow of the young of those species in which the offspring is feeble and helpless at birth. The same observer [13] has also found that the tissues of young animals are particularly rich in lipins, and that the phosphatide content decreases with age.

Now I have maintained the general hypothesis that in the adult lead exercises a toxic influence almost entirely on those special tissues that contain phosphatides in abundance. I have purposely excluded the kidneys and liver from consideration in this connexion, for, although rich in phosphatides, they are specially concerned in the elimination of lead from the organism, and therefore have a double selective action, as it were, on the metal; but of this there is no necessity to take advantage for the purpose of my argument.

It is, then, extremely interesting to know that lead is not only much more toxic to the young and pre-adolescent than to the adult and old throughout the vertebrate kingdom, but also that the *effects produced by the metal are general in the young and local in the adult.* When discussing the question of the affinity of lead for certain phosphatides with my colleagues and others, I have occasionally been asked why it is that lead, if it unites with phosphatides, does not attack equally every cell in the body; for it is generally stated that in all cells phospholipins are present.

The answer is contained in the aphorism I have just given concerning the different effects in the young and in the fully grown—that is to say, in the tadpole, as in the human infant, every cell in the body *is* affected; and, as the result, there is a condition of *somatic stunting.* It may be suggested that such an effect could be produced by the action of lead on the phosphatides of the anterior lobe of the pituitary, but while I cannot at the moment refute such an argument with positive evidence to the contrary, I may point out that this explanation cannot apply to plants. Moreover, whereas the growth of the tadpole is arrested and the animal poisoned by lead acetate in a solution no stronger than 1–100,000—we have not yet determined the minimal effective strength in regard to growth, but this is probably in the neighbourhood of 1–1,000,000—the adult frog is apparently unaffected by a solution containing lead acetate in the proportion of 1–1000. The tolerance of mammals, including Man, to lead likewise varies with the age of the creature concerned. What is the explanation? Why is it that in the young the effect is general and in the adult local?

Surely the reason is clear. In the young all the cells in the body are actively concerned in the processes of growth, and it is highly probable, therefore, that the phosphatides are in some more available form than is the case in the adult—if, indeed, the somatic tissues in general in middle and old age contain phosphatides in abundance. It seems reasonable to suppose, and this supposition is borne out by the related action of lead, that once somatic growth has ceased phospholipins only exist in an available form—physiologically and toxicologically, that is, chemically considered—in those tissues, the nervous, reproductive and the rest, of which I have spoken.

I need say but little more of the chorion epithelium—the most embryonic of all normal tissues of the developing ovum, the tissue of all others that grows with singular activity and invasive power, and which may become "malignant" in its neoplastic proclivities—for surely it is not difficult, in view of the experimental evidence I have already discussed, to understand the rapidity and certainty with which lead attacks the cells in question, nor to appreciate the fact that the effect produced is swifter and more certain in the early days of gestation than in the later phases, when the epithelium has lost its plastic, invasive, and destructive properties.

ABNORMAL CELL-GROWTH.

It is often stated that there is no essential difference between innocent and malignant neoplasia, and in support of this belief it has been urged that it is sometimes difficult to distinguish histologically one from the other, that some growths are locally malignant—for example, ovarian papillomata—and that an innocent neoplasm may become malignant. There are, indeed, those who assert that the clinical history and outcome alone enable the surgeon to settle the question in certain cases, for instance, between a cellular fibromyoma of the uterus and spindle-celled sarcoma, and whether some papillomata be innocent or malignant. Even if we disregard such arguments as these because they refer to the subsequent course of events rather than to initial phenomena, it must be admitted that the primary metabolic factors associated with neoplasia are the same in both types—indeed, in all types of growth—and that the numerous inciting factors in abnormal growth—infection, trauma, and the like—are identical. It is only when we come to the question of somatic as opposed to chorion-like development that the real difference is observable; in the case of an innocent neoplasm hyperplasia occurs, in a malignant dedifferentiated growth supervenes.

I wish to lay some stress on the similarity of the intrinsic metabolic factors concerned in all forms of growth—whether there be somatic differentiation or dedifferentiation—for on this fact the explanation of all our work on cell growth depends. As I have already mentioned, it has been shown by Bullock and Cramer that, in common with all other actively-growing cells, the phosphatide content of malignant tumours varies directly with the rate of growth; the more rapid the growth of the tumour the greater the quantity of phosphatides present.

EFFECT OF LEAD ON ABNORMAL CELL-GROWTH.

If it could be shown that the action of lead is also proportional in its degree of toxicity to the rate and power of growth of malignant tumours, as it is in the case of normal growth, then a complete case would have been made out for the treatment of every malignant growth with preparations of this metal. Unfortunately, the proof is not so readily obtainable as we would wish. Nevertheless, Mr. Patterson has found that in dogs which suffered with cancer and died from lead poisoning, this metal is concentrated in by far the largest proportion in the neoplasm and the testes. He has also found lead in disproportionate quantities in tumours from patients treated with this metal before operation. Why, then, it will be asked, is there any difficulty in treatment? Let me explain.

In our experiments, it will be observed, the growing tissues concerned could not escape from the influence of the metal. It is not possible, however, in cases of malignant disease to make sure that sufficient lead reaches the actively-growing cells; this is, of course, more evident in regard to carcinomata than sarcomata which possess a good blood supply. Moreover, to damage only the cells of the neoplasm and to leave uninjured those of other parts of the organism which may have an attraction for lead is a formidable

proposition. These two difficulties are, without doubt, difficulties of the first order. So far they have not entirely yielded to our attack, although I think the early recognition of them, before the treatment of patients commenced, has led to results that we could not have obtained had we simply administered lead. For the most part patients with malignant disease are adults; consequently there is no "loss" of lead to the normal growing tissues. We are concerned, therefore, in endeavouring to reach the neoplasm without injuring the vital organs which also attract lead.

Now, we have proved that not only in dogs with cancer, but also in the case of the adult human subject suffering with this disease, lead is recoverable from the growth in a quantity out of proportion to that contained in any other part of the body, excepting only the gonads; consequently we may say that lead is attracted to the growth in preference to other tissues, and probably this is so for the reasons I have given. Yet, it still remains true that we cannot be satisfied with the fact that the new growth is capable of holding a large proportion of the lead stored in the body; its powers of attraction unaided may not be great enough for the neoplasm to take from the blood stream sufficient lead entirely to arrest further development. From the first this difficulty presented itself, and seeking to overcome it we endeavoured to find something for which growing tissues have a special preference, possibly not possessed to the same extent, if at all, by the vital organs that show an affinity for lead. The only substance that readily came to mind was thyroiodin, so we have used this in combination with lead in the hope of getting the metal taken up, as it were, by false pretences.

Moreover, we have long considered, and are now trying, a method whereby we hope to "lock" the metal in the neoplastic tissues by means of calcium salts administered intravenously in a colloidal form after the patient has received as much lead as he or she can tolerate. Calcium salts reduce, as is well known, the permeability of the cell membrane. I am glad to say that Prof. Lewis and his collaborators have succeeded in making a very stable calcium colloid that stands boiling and is innocuous to the organism when introduced into the blood stream.

PATHOLOGICAL INVESTIGATIONS.

We have never hoped to obtain on *ordinary* histological examination evidence of a specific change in carcinomata due to treatment with lead. The fact that cancer is a more or less chronic disease and one in which the lesions undergo necrotic and fibrotic changes in the natural course of events, precludes the inclusion of such changes as specific to lead, although we know that similar changes may be produced by this metal in the liver and kidneys. In only one case, in which a rapid cure was effected, was there evidence of unusual appearances. We have not had an opportunity of examining sarcomata before and after treatment except in one case which did not recover.

My colleague, Prof. Glynn, aptly summarises the position in the following statement:—

"All these considerations suggest that *easily recognisable* histological changes in cancerous tissue, produced by lead treatment, will be *slight and non-specific* and will probably resemble those often found in untreated cancer. One would also expect that regressive changes would be more marked at the periphery of the cancer where the vessels and lymphatics are presumably normal.

The examination of all the available sections confirms these suppositions. . . . No marked regressive changes have been noted and certainly no specific changes.

Nevertheless, there is on the whole more retrogression in the treated than in the untreated. This is particularly recognisable by the diminution in the number of epithelial cells and an increase in the amount of stroma. These changes are often associated with distortion, atrophy, œdema, or mucoid change of certain groups of epithelial cells."

I hope when fat stains have been used that we may be able to note some specific change in regard to the lipin content of the cancer cell before and after treatment.

CHEMICAL INVESTIGATIONS AND CONSIDERATIONS.

Lead and the Phosphatides.—It will be wondered whether we have any chemical evidence to support certain explanations I have given, particularly in regard to the way in which lead inhibits growth. Whether this metal has an affinity for phosphatides that can be demonstrated on the bench of a laboratory. As I have already implied, the selective action of any toxic substance must depend on chemical affinity between the toxic body and some element or elements in the tissues affected. I use the term "chemical affinity" in the widest sense to include manifestations ascribed to the processes associated with physical chemistry. There is, however, a tendency today to look upon all phenomena, even adsorption, with a stoichiometrical eye.

In quite the early stages of the investigation we had found that an emulsion of *commercial* lecithin is immediately precipitated by ionic solutions of lead acetate; and that zinc and copper acetates have relatively less effect in this respect. With regard to the phosphatides it must be remembered that they, or at any rate those of which we have any substantial knowledge, are all associated in the tissues, and that it is only with considerable difficulty that they can be separated and obtained chemically pure. The different solubilities in alcohol of lecithin, kephalin, and sphingomyelin are of assistance in differentiating one from another. Prof. Lewis has found that both commercial and pure lecithin in water have negative charges as demonstrated by the cataphoresis method. This, of course, is of importance in regard to the question of combination with cations, such as lead. Experiments were also conducted with various metallic salts in relation to pure and commercial lecithin, and pure kephalin and sphingomyelin. It was found that whereas divalent cations precipitate both kephalin and sphingomyelin, lecithin, when pure, is not precipitated either by lead ion or lead suspensoid, or, indeed, by any divalent cation. Since there is total precipitation by lead ion of the commercial lecithin emulsion, which contains all three phosphatides, it would seem that lecithin is carried down by the lead kephalin and lead sphingomyelin precipitates. Cholesterol appears to favour this reaction, presumably by increasing the degree of dispersion of the commercial lecithin emulsion.

The fact that pure lecithin is not precipitated by lead does not by any means prove that there is absence of chemical combination between them. In one of the interim reports by Prof. Lewis and Dr. Corran is the following discussion of their investigations into this question:—

"From the above experiments on precipitations of commercial lecithin emulsions by lead suspensions, it would appear that absence of precipitation does not necessarily denote absence of chemical combination. In fact, experience tends to point to the conclusion that precipitation in such cases is purely an adsorption phenomenon. For example, on the addition of a calcium salt to commercial lecithin, a ppt. is obtained. On attempting to wash this ppt. it apparently re-emulsifies. This suggests that the precipitation is caused by the adsorption of calcium ions, and when the latter are removed by washing the lecithin reverts to the emulsion form. Work is at present being carried out to decide whether this ppt. with calcium is a chemical or an adsorption compound.

In the case of lead ion, which apparently forms a definite compound with at least one of the constituents of commercial lecithin, precipitation would not occur, according to the above considerations, until there was excess lead ion above that required to form the chemical compound. The observation has been made that, on attempting to wash the ppt. formed by the addition of lead acetate to commercial lecithin emulsions, there is a great tendency to re-emulsify. Thus, in the case of Levene's pure lecithin, although neither lead ion nor lead suspensions caused precipitation, it was quite possible that the resulting emulsion consisted of a combination of lead and lecithin. Unfortunately, the resulting emulsion in this case was not tested to see if the lead was in combination with the lecithin, since it was to decide whether or not lead ion actually precipitated pure lecithin that the experiment was primarily performed."

It is unfortunate that the difficulty of separating lecithin from kephalin and sphingomyelin is considerable, and that we have been able to procure—and this we owe to the kindness of Dr. Levene, of the Rockefeller Institute—only a small quantity of pure lecithin. Nevertheless, since lecithin is so closely associated with the other phosphatides in the tissues, and resembles, in fact, commercial lecithin in this respect rather than pure lecithin, it is hardly possible that it would remain unaffected if the other phospholipins were combined with lead. The interesting observation has been made in the Physical Chemistry Department that the percentage of lead in the lead-lecithin (commercial) compound is between 11 and 12 per cent.

Although I have suggested that the rôle played by lead in the phenomenon of arrested growth depends on a direct chemical reaction between lead ion and phosphatides, we must not overlook the possibility that lead may act in other ways; for example, by the inhibition of enzyme action in relation to growth. The distinction between these effects, however, may not be so great as appears at first sight, since such a function of lecithin as, for instance, that of an oxygen carrier, might indirectly affect enzyme action.

Experiments Concerning Hydrogen-ion Concentration.—The hydrogen-ion concentration has often been taken into account in explanations of the effects of solutions on either side of neutrality, which are believed to exercise a beneficial or detrimental influence on normal growth. Prof. Lewis and his colleagues have devoted much time to the study of the hydrogen-ion concentrations in the various preparations that have been used experimentally and therapeutically for the arrest of normal and abnormal cell-growth. This has been considered a matter of some importance, not only in connexion with the views that have been expressed concerning the influence of acid and alkaline solutions on, for instance, sea-urchin's eggs,[14] but also in regard to the effect that might be produced by tissues—normal and abnormal—on the preparations injected into the blood stream. In the first place, it was found that the pH of lead suspensions could not be accurately measured by means of the usual hydrogen electrode, owing to the fact that there is a chemical reaction between the hydrogen and the lead suspension, and this causes the hydrogen electrode to register an oxidation potential. The Biilmann quinhydrone electrode [15] was therefore tested with solutions of known pH and found accurate. It was again observed, however, that the results with lead suspensions were neither uniform nor correct. It was accordingly decided to try a gold terminal instead of one made of platinum, for it was thought that the platinum was acting as a catalyst. We had no knowledge at that time that gold had been used quite recently for a somewhat similar purpose in Gowland Hopkins' laboratory. With the adoption of a gold terminal satisfactory results were obtained with the Biilmann quinhydrone electrode. I do not think it necessary at this stage to say more than that the suspensions of lead prepared by Prof. Lewis have a pH of 10·9 when the lead content is 0·25 per cent., and a pH of 10·3 when 0·1 per cent.—both distinctly on the alkaline side. An examination of a partly ionic, partly colloidal, preparation of lead iodide made by Mr. Patterson revealed a pH of 5·5, which is on the acid side of neutrality. It now remains for the pH of malignant tumours in situ to be estimated and compared with that of the normal tissues of the same patient.

Functions of Cholesterol and Lecithin in Cell membranes.—Another matter of great biochemical interest has been investigated by the same workers: namely, the function of cholesterol in cell membranes, and the effect of lecithin on oil-water interfacial tension. According to physicochemical theory any substance which is soluble in oil and at the same time lowers the interfacial tension between oil and water will favour the formation of a water-dispersed-in-oil type of emulsion. It was found that cholesterol and calcium chloride have a similar action in that they decrease the interfacial tension between oil—olive and cotton-seed oil were used—and water. Calcium soap has long been known to be more "soluble" on the oil side of the interface, and cholesterol is soluble throughout the bulk of the oil to which reference has been made; consequently cholesterol and calcium favour the formation of the water-dispersed-in-oil type of emulsion, of which butter is an example. As cotton-seed oil and olive oil were employed in the experiments it is not possible to do more than surmise that the cell membrane, which is believed normally to consist of a water-dispersed-in-oil system is similarly affected. Lecithin appears to have an influence exactly opposite to that of cholesterol: that is to say, lecithin favours an oil-dispersed-in-water emulsion, an example of such a system being cream.

The practical suggestion arising from this work is that in carcinoma, in which the proportion of lecithin to cholesterol has been found to be higher than in normal tissues,[16] the cell membrane will be less stable owing to the fact that it probably exists as an oil-dispersed-in-water, in contrast with the normal water-dispersed-in-oil, type of emulsion, with increased permeability of the cell covering.

Action of Lead on Enzymes.—Dr. Coope and Dr. Jowett have commenced a series of investigations concerning the effect of lead on enzyme action, and these workers have issued an interim report. The results, however, have proved difficult of correlation and interpretation. Nevertheless, it appears that lead has a definite retarding effect on tryptic digestion. It is, however, quite impossible to say at present whether lead influences the enzymes that may be concerned in cell growth. The work is to be prosecuted on new and more extended lines.

Preparation of Lead Suspensions.—The great advantage of utilising lead suspended in a colloidal form is obvious. It is lead ion that produces the poisonous and probably the therapeutical effects; but owing to the highly toxic action of large amounts of lead ion it is not advisable to use it therapeutically by intravenous injection; at least, if we do, we are using a preparation that is uncontrollable and highly dangerous. A large amount of work has, therefore, been conducted in an attempt to secure a reliable and *stable* preparation of lead suspension. In regard to complete stability—stability of more than a few days' duration—we have failed. First, we employed lead iodide suspended in gelatin. It occurred to us to use thyroiodin as our source of iodine, and to employ a calcium salt to increase the stability of the suspension by decreasing, as I thought, the power of what is generally called "imbibition" on the part of the gelatin coverings of the suspended particles. This suspension was prepared by Mr. Patterson. Prof. Lewis, however, attributes the action of calcium in this respect to electrical protection of the ordinary kind resulting from adsorption of the divalent calcium ions on the colloid. Whether the calcium likewise affects the adjacent layer of gelatin in the sense of "hardening" he thinks uncertain. Subsequently, it was proved that the lead iodide preparation is only partly colloidal, and that it always contains, as we had suspected, lead ion in considerable quantity.

Next, much work was done in the Muspratt Laboratories in regard to lead suspensions made by the electrical method of Bredig. By the use of calcium increased stability was secured and in a summarising interim report Prof. Lewis and his colleagues state:—

> "We conclude, therefore, that calcium ion is an indispensable adjunct for the preparation of stable suspensions of lead. It was also observed that the addition of isoelectric gelatin further increases the efficiency of the protective action of calcium ion on lead suspension."

Weak acids immediately convert this colloidal suspension of lead into lead ion. Yet, although the suspension can be boiled and will remain stable for perhaps three days, so far we have failed to produce a preparation which can be generally utilised.

Another initial difficulty which has been easily surmounted was the large size of many of the particles of lead in the electrically-prepared suspension. These, however, can be thrown out by centrifugalisation, those remaining being no larger than 0·3 μ in diameter.

I have spoken of lead ion as being active, and of truly colloidal lead as inert; but it is certain that suspensions are disturbed, and lead ion slowly produced in the blood stream, and rapidly in any part of the body in which the hydrogen-ion concentration is high, such as would obtain in a tumour undergoing autolysis. As I have said, we have not yet, but hope soon to have, information concerning the hydrogen-ion concentration in actively growing neoplasms in which there is no degeneration.

The very numerous and arduous experiments conducted in the Muspratt laboratories, which will, I hope, be published eventually, may throw light on much beyond that with which we are immediately concerned.

In concluding this summary of the chemical investigations, I may say that our chief difficulties now lie, not so much in justifying the original ideas concerning the action of lead on growth, for that has been made evident, even though the complete chemical mechanism may require further elucidation, as in applying them to the treatment of malignant disease. This has always been the case in the treatment of tropical diseases, syphilis, or any other malady that has long resisted curative therapy.

Here we are faced, in the first place, with the problem of introducing lead into the blood stream in an inert state, and, although growing tissues have themselves an attraction for this metal, of getting it in sufficient quantities into the new growth alone. In the second place, even though we get lead into the tumour, can we ensure that it stays there and produces the effect required? I have endeavoured to relate the means we have adopted, and are adopting, to get over these apparently insuperable obstacles to successful treatment.

CLINICAL WORK.

It has been a source of pleasure to me to learn from some of my fellow-members of the Society that they are more interested in the scientific aspect of the subject, which I have just endeavoured to expound, than in the purely clinical, for they wisely realise that at first, at any rate, there are and must be the difficulties of which I have spoken, and that patience, time, and energy alone can overcome them. In acknowledgment of this thoughtful point of view, and because a number of patients, believed to be cured of sarcoma and carcinoma, presented themselves for inspection and examination before the Address, I shall deal very briefly with our clinical work.

Methods of Treatment.

Intravenous Injection.—It is almost certain that the ultimate mode of treatment in malignant disease will be by the blood stream. Wonderful as may be the results of operation, and of applications of X rays and radium, the field of action, so far as these procedures are concerned, is a local one. Moreover, even though the growth be quite local, there are many cases in which it is beyond the reach of such methods of treatment. There are, too, numerous instances in which metastases are present in inaccessible organs. All this is recognised by the thoughtful surgeon. It is, however, well that the limitation of local treatment should be repeatedly emphasised, lest too great a sense of contentment obstruct our view of better things. In three years (Nov. 9th, 1920 to Nov. 9th, 1923) 1531 intravenous injections were given, chiefly by Mr. Woolfenden. At first we used only partly colloidal lead iodide preparations of which many variations have been made; when this preparation is now employed, we inject what is known as A_1 A_2 prepared as soon as possible before injection. As this can be kept in two solutions, it might be generally used were it entirely satisfactory; but it is not, for it is only partly colloidal in nature, and therefore toxic. The electrically prepared colloid made in the Muspratt laboratories appears to be satisfactory in respect of its atoxicity. We believe that lead ion is slowly liberated from the colloidal solution in the blood, and thus a more or less continuous small dosage of lead ion is administered.† The preparation now in use is known as S_3.

Intramuscular Injection.—It is sometimes extraordinarily difficult, in fat women, to give an intravenous injection however skilful the operator may be. We have never been defeated in the end, but it is possible that some day we may be. We have, therefore, given thought to the question of intramuscular injection in such circumstances; and Mr. Patterson has prepared for the purpose a combination—as we believe—of lead and cod-liver oil. Our animal experiments with this material, although they have not been pushed to a final conclusion, indicate that such a preparation is not very readily absorbed. In any case, intramuscular injection will never be a method of choice.

Ionisation.—A third method of administration has been utilised—namely, ionisation. We have found that this method of treatment is only useful when the patient has been poisoned with intravenous injections, and no more are justifiable for the time being. Although we have not observed much change in a superficial growth, pain appears often to be relieved. The type of case in which we have employed ionisation has been that in which there are hard avascular secondary skin nodules or secondary deposits in the sternum. On the other hand, Dr. Annett has treated three rats with large malignant tumours,‡ and in every case the tumour has entirely disappeared. Borrel [17] has obtained somewhat similar results with lead ionisation of rat tumours. In contradistinction, a case of cancer of the scrotum of a dog did not appear clinically to be altered by this method of treatment.

Lead and X Rays.—We have seen several very striking instances in which tumours in patients first treated with lead without the disappearance of the growth subsequently exhibited striking retrogression after applications of X rays. In some cases X ray treatment had had no effect previously to treatment with lead. The beneficial effect, or perhaps I should say augmented effect, of X rays in these cases is probably due to secondary radiations produced by the lead in the tumours. Dr. Roberts has in hand some experimental work on this subject.

Immediate and Remote Effects of Injections.

These effects are local and general. Formerly there was considerable general disturbance after an intravenous injection, vomiting, rigors, and rise of temperature being usual concomitants. Now, however, if the improved material be warm and the injection of it be slow, a general reaction is rare. In carcinoma, œdema around the lesion is frequently observed after a few injections. Sometimes with sarcomata a considerable local reaction is produced after about the third dose. If the tumour be near the surface, the skin over it becomes tense and red, and a slight general febrile reaction may supervene. In a large majority of all cases, whatever the nature of the neoplasm may be, the patients complain of *pain in the growth between two to eight hours after injection.* Our attention has repeatedly been called by the nurses in charge to this suggestive phenomenon.

Interesting as are the immediate results of the administration of lead, it is in the remote effects that we are chiefly interested. The local alteration in large, hard, carcinomatous tumours, when this is observed to be following a satisfactory course, consists of a definite lobulation of the surface, as though the mass were breaking up into separate smaller tumours.

† I have long held the view that calcium ion in the blood has its source of origin in the colloidal—so-called "combined" or "masked"—calcium.

‡ Annett, H. E.: Rat Sarcoma, for which we are indebted to Dr. J. A. Murray, of the Imperial Cancer Research of the Royal College of Physicians and Surgeons, London.

At this juncture such cases should be subjected to X rays. Sarcomata may soften and liquefy, giving rise to serious complications; or, after the preliminary reaction, which is probably due to gradual liquefaction, they may be absorbed. Many patients who are improving under treatment accumulate fat rapidly. Whether this is due to a general improvement in their condition or to an action of lead on the lipins of the pituitary it is not at present possible to say. The remote general disturbances consist, of course, of the symptoms of lead poisoning to which I need not further refer. In a few cases we have used intramine, which is supposed to have the faculty of assisting in the elimination of the heavy metals, but I do not think we have observed any definite beneficial result follow the administration of this substance.

At this point I would emphasise the fact that lead poisoning in its grave forms is a very real danger. Yet, with increased experience in the estimation of the value of the changes in the blood and urine, in the interpretation of symptoms, and, above all, in the spacing of the doses according to the nature of the neoplasm and the individual tolerance of the patient, we now feel that the dangers to which the patients previously were exposed have been considerably lessened.

Types of Cases Treated.

From a summary of the cases treated I find that there is not a single early case. Some have been operable in the sense that we ourselves have operated usually in order to reduce or remove the mass of growth; and it is possible that one or two of the operations cured the patients. There is none, however, in which a favourable prognosis could have been given. In most the outlook has been hopeless. Two-thirds (81) of the total number of cases have been primary and one-third (41) secondary in origin. In many in which the disease was primary there were metastases. The following is a list of the sites of the primary lesions in our cases.

Carcinoma.—Mammæ, cervix uteri, rectum and colon, stomach, pancreas, œsophagus, tongue, tonsils, pharynx, superior maxilla, ovaries, parotid, kidney, mediastinum, glands of the neck, vulva and vagina.

Sarcoma.—Femur, humerus, scapula, sacrum, superior maxilla, small intestine, and (?) generalised involvement of abdominal lymphatic glands.

The results are summarised in the table below.

After-histories of Patients treated with Lead between Nov. 9th, 1920, and Nov. 9th, 1923.

Received intravenous injections	122
Alive and believed cured	19
Disease arrested or retarded over periods between one and three years	6
Under treatment and improving	6
Under treatment for too short a time for an opinion to be formed	7
Disease arrested, but patient died of intercurrent affection	1
Died from malignant or intercurrent disease shortly after treatment commenced	20
Have shown some improvement, but have subsequently died	13
Alive, but are not improving	2
Commenced treatment which was discontinued either because they were too ill or at their own request	18
Died from malignant disease without showing improvement	30

I do not propose to dwell on these statistics, for all statistics—like emulsions—are notably reversible. If I were to do so I might be tempted to remove from consideration those cases which died within a few weeks of being seen for the first time, those that died of intercurrent affections, those in which treatment was stopped, and those which have not been treated long enough for an opinion to be formed. I should then be left with a very satisfactory percentage of what we are content to call "believed cured." Time, however, is a factor that plays its part in the final estimation of results.

Discussion of the Clinical Work.

If I may draw provisional and conservative conclusions from our clinical work, which has been done on a fairly large scale, I must call attention in the first place to the fact that a large proportion of the material which we have received for treatment was totally unsuitable for any treatment—the cases were actually dying. Dr. William Mayo, who saw with me some of the worst cases then under treatment, said in his incisive way, "Surely you are expecting miracles, not cures." I am glad to say that so far his prognostications have not proved entirely correct, and I think he would be interested to know that some of the cases are still alive and are better than when he saw them, if not well. Nevertheless, this great surgeon was right in one sense; the strain of having to expect "miraculous" happenings or death is not good for the mind or body of the surgeon.

In the second place, I would say that patients in good condition in whom the growth is inoperable, whether it be primary or secondary, should have the opportunity of treatment. There is nothing else that offers any hope. When the case is operable, I believe that the tumour should be removed and the patient treated immediately after operation to prevent recurrence. Serious radical operations with a large primary mortality—such as the extensive Wertheim operation for carcinoma of the cervix—may possibly be avoided if the patient can be treated after operation. Vaginal hysterectomy, for instance, even when the growth has not been entirely removed, has given encouraging results when intravenous injections of lead have subsequently been administered. Last, it is safe to say, that the combined treatment, first with lead and subsequently with X rays, should be tried for all inoperable but accessible growths. Possibly ionisation followed by applications of X rays may be advisable in certain cases.

With regard to the future of the work I can say this: in the treatment of cancer there never can be a cure for all the dying cases we have seen—there is in some as much abnormal tissue as normal. I firmly believe that we are on the right—perhaps I should say "the best"—line of investigation and treatment. It is, indeed, to my imperfect comprehension the only truly scientific path along which further advance can be made.

That we use lead is, perhaps, a confession of weakness; for, to return to my original hypothesis, when we have isolated or synthesised the biological substance—the somatic tissue secretion that controls the chorionic epithelium and cell correlation, for which I sought in vain—when we have done this we shall have, at least theoretically, a true specific. Meanwhile, we use lead, for it fulfils the experimental, and often the clinical, demands made of it. I do not deny that there may be other substances that will do all that lead can do in regard to growth and be less toxic in other respects. All these considerations are included in our scheme of work.

In conclusion, I must acknowledge the generosity of our friends the members of the Cancer Research Committee, and the ability and cordial coöperation of my colleagues who have enabled the investigations to be prosecuted in so thorough and scientific a manner. I fear this presentation of the work has fallen far short of what is due to these endeavours.

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LEPROSY, A SELF-HEALING DISEASE.[1]

BY ERNEST MUIR, M.D., F.R.C.S. EDIN.,
RESEARCH WORKER IN LEPROSY UNDER THE INDIAN RESEARCH FUND ASSOCIATION, SCHOOL OF TROPICAL MEDICINE AND HYGIENE, CALCUTTA.

Hansen[1] and others have stated that leprosy shows a tendency to spontaneous recovery in many cases; but the significance of this fact does not seem, as far as I am aware, to have been realised by modern writers on leprosy.

Immunity.

If we compare leprosy with the well-known self-healing diseases, such as lobar pneumonia, enteric, or small-pox, we notice a great difference in the course of leprosy as compared with these diseases. In the latter we have a short incubation period, a rapid onset and rise to a climax when immunity has become sufficient to cause more or less rapid diminution and disappearance of the disease, the whole course being finished within a comparatively few days. The object of this paper is to show that there is a similar process in leprosy, only that what happens in a few days in small-pox and enteric happens in as many years in leprosy. The length of time taken by leprosy to pass through all its stages (sometimes a whole life-time, though it is often much less) has obscured this fact regarding the nature of leprosy. Yet, as Newton learned much about the properties of the earth from a falling apple, so we may learn much about leprosy, the "king of diseases," from these short-lived fevers.

Leprosy resembles tuberculosis in many respects. In both diseases the bacillus is acid-fast. This property of acid-fastness is apparently due to some lipoid substance contained in the bacilli which directly or indirectly prevents the quick formation of immune bodies such as are formed in rapidly self-healing diseases. For this reason neither leprosy nor tuberculosis is a rapidly self-healing disease, although in both of them there is a slower and more gradual production of immunity.

While this is the chief point of resemblance between leprosy and tuberculosis, an important point of difference lies in the fact that, while tubercle attacks vital organs, leprosy confines itself almost entirely to the skin, mucous membrane, and peripheral nerves.* Thus, while tubercle is a fatal disease, leprosy is a disease of disfigurement and disablement and is seldom directly fatal except in the more active forms of the nodular type. The death of leprous patients is generally the result of complications many of which are preventable, or it is due to the inability of the patient to get work or to do work which will maintain him in the necessities of life.

A well-nourished leper may have nearly the whole surface of his body covered with skin every cubic millimetre of which contains billions of lepra bacilli and yet he may maintain comparatively good health, being able to work strenuously 12 hours a day and carry on a large business. No tuberculous patient harbouring even a far smaller number of tubercle bacilli could be expected to live for long. Thus, in tuberculosis, while there is a slow immunity-producing process present, death supervenes before sufficient immunity can be induced to cause self-healing of the disease; whereas in leprosy, which is seldom of itself a fatal disease, spontaneous recovery frequently takes place. The course of a typical case of leprosy may be indicated by a rising and falling curve, the summit of which denotes the point at which sufficient immunity has been induced to cause the gradual elimination of the disease from the body.

The course of leprosy may be conveniently divided into three stages. In the first, which corresponds with the beginning of the curve, the bacilli are few in number, the lesions are not widespread, and immunity is low. In the second stage, which corresponds with the rise of the curve, the bacilli have multiplied, but immunity is still low. In the third stage, which corresponds with the descent of the curve, lesions are widespread, but show signs of resolution and disappearance. Immunity has increased to such a degree that self-healing has begun to take place.

It is highly important to be able to recognise what stage of the disease a patient has reached. This can only be done with any certainty by the clinical appearance of the lesions. In cases in which there are widespread lesions, especially if these are lesions of the skin type and not of the nerve type, and if these lesions appear to be resolving, becoming less erythematous and swollen and presenting the typical appearance of resolved lesions, then it is not difficult to conclude that the patient has reached the third stage. I have described the appearances of such lesions more fully elsewhere.[3 4] The recognition of the stage in leprosy is of vital importance both in the prognosis and the treatment.

General Resistance of the Tissues.

This must be clearly distinguished from acquired immunity. Various attempts have been made to inoculate leprosy on experimental animals, but, as far as I can judge, none of these attempts have as yet been successful. This is undoubtedly because the resistance of the tissues in these animals is too strong to allow of the bacilli multiplying and forming lesions. In other words, the tissues of these animals do not form a suitable soil for the growth of the leprosy germ. Various attempts have also been made to inoculate lepra bacilli on man. With one possible exception these also have failed, the reason probably being the same—viz., the general resistance of the tissues was too strong in these individuals so that they did not form a congenial soil for the growth of the lepra bacillus.

The onset of leprosy is almost invariably associated with the lowering of this general resistance in some way or other. The first signs of the disease frequently occur during or after some acute disease which has temporarily lowered the resistance, and these signs not infrequently subside once more as resistance is restored after recovery from the acute disease. This subsiding and disappearance of lesions must be clearly distinguished from the similar process which takes place in the third stage of leprosy due to the production of immunity. In the former case we have a restoration of the natural general resistance of the tissues which had been temporarily lowered; in the latter we have the formation of antibodies and the acquiring of special immunity to leprosy.

When, however, the onset of leprosy is associated with the lowering of the general resistance due to some cause which is neither temporary nor self-healing, leprosy continues to make headway in the tissues of the body until such time as one of three things occur: (*a*) The general resistance is restored, (*b*) the patient passes into the third stage and the disease becomes self-cured, or (*c*) the patient dies of some complication or of some other cause. Chief among such causes of prolonged lowered resistance may be named chronic bowel diseases, syphilis, and other chronic diseases, unsuitable diet, unfavourable climatic, sanitary, or economic conditions.

The Phases of Leprosy.

In acute infectious diseases the multiplication of the causal organisms is synchronous with acute toxic symptoms, toxins being set free by the bacilli as they multiply and in proportion to their numbers. In leprosy, however, the multiplication of bacilli may go on rapidly with but few toxic symptoms, and, as is mentioned above, huge numbers of bacilli may be present in the skin while the patient retains comparatively good health (Fig. 1). On the other hand,

* It is true that in fairly advanced cases of leprosy the bacilli are often found in the internal organs, but when the functions of the internal organs are severely affected it is generally due to amyloid or some other form of cell degeneration, the result of absorption of toxins from septic sores, and is not due, directly at least, to the presence of lepra bacilli in the affected organs. Exceptions to this are leprosy of the lungs and the testis, but the former is very rare and the latter, being painless, is seldom complained of and is certainly not likely to lead to a fatal result.

acute febrile and other toxic symptoms may occur while the number of bacilli is still comparatively small.

The apparent cause of this is that, as the bacilli multiply, they secrete a glutinous substance which fastens the newly-formed bacilli to the bacillary mass or to the cells lining the lymph spaces, and this substance, which envelops the bacilli, prevents the setting free of toxins. Under certain circumstances,

FIG. 1.

Photograph of a sweetmeat-seller who is able to carry on his business and enjoys fairly good health.

however, changes take place either locally or throughout the body which affect the bacilli and their glutinous matrix, toxins are set free, and febrile and other symptoms occur. Not only are toxins set free, but bacilli also are very often set free and carried to other parts of the body where, under favourable circumstances, they form new foci and lead to a further extension of the disease.

What the circumstances are which bring about the above-mentioned changes in the bacilli and their matrix I do not intend to discuss here, suffice it to say that the injection of certain drugs, the application of counter-irritation, and various febrile diseases are among the commonest causes.

The condition of leprous lesions may be conveniently divided into three phases according to their state at the time being, as judged by the appearance of the bacilli and their effects on the surrounding tissues. The first is the *quiescent* phase in which the bacilli multiply without giving out toxins. There is very little tissue reaction as shown by cell infiltration and fibrous tissue formation, and the bacilli are more or less uniform in shape, size, and staining. In the second or *reactionary* phase, toxins are set free and all the appearances of an inflammatory reaction are produced. There is an increase in the number of cells which infiltrate the lesions affected and dilatation of the capillaries and other local blood-vessels. Externally, the lesion is erythematous and raised bove the level of the surrounding normal skin. The acilli, instead of staining uniformly, stain only in parts, so that they have a dotted or granular appearance; some of the bacilli stain uniformly faintly and others show spores or gonidia which, when stained for half an hour in cold fuchsin and then decolorised for two minutes in 10 per cent. nitric acid in absolute alcohol, take on a much darker stain than the rod part of the bacillus. These spores are more than twice the thickness of the rod and appear at the centre or end of the rod or else separately apart from the rod. There is good reason to believe that both the granular and the spore forms indicate that the bacilli are either being destroyed or are at least in unfavourable conditions for growth and vegetation. Such reactions may be local or general, some of the lesions or all of the lesions being affected. Part of a lesion or the whole of it may react and some of the bacilli may be affected, others remaining as they were. In the third phase, which may be called the phase of *resolution*, the swelling, erythema, and other signs of the preceding inflammatory phase disappear. Skin lesions, which have reached this phase, will show the appearance of crushed tissue paper on the surface. This is due to the thinning of the epithelium which took place in the inflammatory phase as the result of the pressure of the underlying corium, a wrinkled surface now showing as the inflammatory pressure has been removed. In this phase the cell infiltration is replaced by fibrous tissue to a certain extent and the bacilli which have become granular during the inflammatory phase gradually disappear. The extent to which resolution takes place varies with the severity of the preceding reaction.

Leprous lesions are constantly passing through these three phases, but, while the older lesions are reacting, the fresher lesions are spreading to the adjacent lymph spaces. This process may be seen (Fig. 2) in radially-spreading, superficial lesions, and is very well shown in slightly pigmented skins where we find an outer zone of depigmentation corresponding with the quiescent, non-inflammatory spread of the bacilli; inside this there is a raised, erythematous zone corresponding with the phase of reaction; while in the centre erythema and swelling have both disappeared, representing the phase of resolution. We may thus have the three phases coincidently in one lesion, or we may have the three phases succeeding one another, reaction having been suddenly set up in quiescent lesions due to some known or unknown cause and being followed by resolution.

In the reactionary phase not only is there setting free of toxins, but there is also setting free of bacilli in the blood-stream. Many of these are carried as emboli to other parts of the skin and show their presence by the formation of small inflammatory nodules. In the third stage, or when in the first and second stages the general tissue resistance is sufficient, these nodules quickly disappear, the bacillary embolus having been absorbed. When, however, either the general resistance or the acquired immunity are not sufficient to destroy the bacillary embolus it forms the centre of a new focus from which the bacilli spread once more through the lymph spaces.

Treatment.

In order to understand the lines along which treatment may be successfully carried out, it is necessary to consider the significance of: (1) The general body resistance; (2) immunity as indicated by the stage at which the patient has arrived; (3) the phases through which lesions pass to resolution.

It may be asked: "If leprosy is a self-healing disease like the acute, febrile diseases, what is the need of treatment?" The answer is that leprosy, though not as a rule a fatal disease, is one of the most dreaded because of the deformity and disablement which it causes, and the object of treatment is to cut short its course in the first and second stages and, where it has already reached the third stage, to hasten the resolution of the lesions by causing moderate reactions.

A. In the first stage we have the disease in a limited form with few bacilli in the body, little or no acquired

immunity, and either diminished general resistance (temporary or permanent) or the presence of some other condition which is favourable to the increase of the disease. Attention in this stage must therefore be directed to: (1) The diagnosis and removal of whatever diseased condition, environment, or unsuitable diet is lowering the general tissue resistance or making the tissues a suitable medium for the growth of the lepra bacillus. (2) The induction of immunity by the injection of antigens. Defatted acid-fast bacilli may prove useful. (3) The destruction of lepra bacilli by the injection of preparations of fatty

FIG. 2.

Radially spreading leprous lesions of the back. Lepra bacilli could be found in the erythematous zone of some of these lesions. (From a coloured drawing.)

a = Large lesion caused by the coalition of smaller radially spreading lesions.
b = Depigmented outer spreading margin.
c = Erythematous inner spreading margin.
d = Scar left after resolution in centre of lesion.
e = Normal skin.

acids. I have found the esters of the fatty acids of hydnocarpus and chaulmoogra oils specially useful for this purpose. Counter-irritation by infiltrating esters into the subcutaneous tissue under skin and nerve lesions or by the external application of such substances as trichloracetic acid (a 1 in 3 solution in distilled water painted on to lesions every six or ten days).

B. In the second stage the same remedies should be used, but with more care. The bacilli are plentiful and there is grave danger that, in the absence of acquired immunity, further dissemination of the disease may take place, as is frequently the case if violent reactions are allowed to occur. Even greater stress must be laid on the necessity of increasing the general resistance. Theoretically, antigens in the form of defatted acid-fast bacilli should be useful, but I have not yet had sufficient experience of their value to speak with confidence. Trichloracetic acid used as mentioned above is very valuable. The esters of the fatty acids are very useful, but they must be used with great care especially if the general health is not good.

C. In the third stage, where a fair degree of immunity has been acquired, all the above-mentioned forms of treatment should be pressed. Vaccines, however, are not of much use as compared with the other forms of treatment. Considerable reactions are generally followed by marked improvement and there is not the danger of an increase of the disease which there is in the second stage. Large injections of the esters of fatty acids may be given, and, when these do not have sufficient reaction-producing effect, the reaction level may be lowered by the oral administration of potassium iodide, beginning with a daily dose of half a grain and gradually working up the dose to the limit of the patient's tolerance. Many patients will react with small doses of the esters when under the influence of potassium iodide in whom large doses of the esters without iodide produced no reaction. This effect is dependent on the presence of large numbers of lepra bacilli in the body. Many leprous patients will complain of severe pains in the limbs and head after the administration of a quarter to one grain daily for a few days. It is then well to stop its administration for a few days and to renew it after the pains have subsided. In all the stages of leprosy regulation of diet, abundant exercise, and careful regulation of the bowels are absolutely essential if good results are to be obtained. I have dealt with the details of treatment elsewhere.[2 4]

Prognosis.

The fact that leprosy is a self-healing disease is also of great importance in the prognosis. When a case has passed through the third stage there is but little chance of recurrence of the disease. In India many of the begging lepers who present their deformed limbs to passers-by in the hope of exciting pity are no longer suffering from the active disease. Careful post-mortem examination fails to find any lepra bacilli. In many of such cases perforating and other ulcers from which they suffer are trophic and are due either directly to defective nerve-supply following fibrosis of the peripheral nerves or to burns and cuts incurred through anæsthesia and insensibility to injuries. Such cases are almost entirely the result of neglect, but they cannot be said to be suffering from leprosy after lepra bacilli have been eliminated from the body. Many of them are cures of Nature, though the cure may be considered as worse than the disease, and they illustrate the fact that leprosy has a tendency to self-healing.

Under careful treatment, however, leprosy may heal with little or no deformity; and, when the patient has passed through the third stage, there is good reason to believe that there is sufficient immunity to ensure that there is only a remote chance, if any, of a return of active disease. When a patient, who has passed through the third stage, has, during a period of two years, given only negative results on repeated bacteriological examinations, and when there has been during that period no sign of fresh anæsthetic lesions and no increase in the size of any of the existing ones, I consider that he is cured. If, however, lesions have disappeared with or without treatment during the first or second stage, and two years with negative bacteriological examinations have passed; or, in nerve leprosy, if the anæsthetic lesions have to a great extent regained sensation and no new lesions have appeared during that period nor have any of the old lesions increased in size, the case should be considered one of *relative* cure, though the absence of immunity does not justify the prognosis of an *absolute* cure.

Cases such as have been referred to above, where the general resistance of the tissues has been lowered by some temporary cause, such as an acute fever, and the leprous signs, which have appeared during the period of lowered resistance, disappear again as the resistance returns—such cases must be distinguished from those in which the disappearance of leprous lesions is due to acquired special immunity. Recurrence is not uncommon in the former if at any future date the general resistance is again lowered; recurrence in the latter seldom or never occurs.

Obviously, one of the chief difficulties which will arise in the mind of the reader is how to tell with certainty which particular stage the patient has reached. I have dealt with this in more detail elsewhere.[3] To anyone who is familiar with the appearance of resolved and resolving leprous lesions the difficulty is not so great as would at first appear. There is, of course, no clear-cut line between the different stages, but in a case which has advanced as far as the doubtful border-line between the second and third stages, no harm will be done by treating the case as one in the third stage. Unfortunately, no complement-fixation or other serum reaction has been discovered which is of any value in testing the specific immunity in leprosy and we must rely for our evidence upon clinical signs.

Summary.

1. Leprosy is a self-healing disease, in typical cases of which immunity is gradually produced.

2. Delay in immunity production is due to the nature of lepra bacilli which are able to multiply with few or no signs of local or general toxæmia.

3. During the first two stages of leprosy it is most important to restore the lowered tissue resistance, otherwise the disease may pass on into the third stage.

4. In the third stage, where immunity has been produced, it is important to bring about moderate reactions so as to hasten the resolution of the lesions before deformity and disablement can take place.

5. In cases which have passed through the third stage an absolute cure may be hoped for as far, in many cases, as the active disease is concerned; while in cases which have recovered without passing through the third stage the cure can only be considered a relative one, recurrence being possible should the tissue resistance be seriously lowered at any future time.

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THE EFFECT OF ALTERATION OF TEMPERATURE UPON THE RATE OF THE ISOLATED HEART.

BY W. M. FELDMAN, M.D. LOND., F.R.S. EDIN.,
PHYSICIAN, ST. MARY'S HOSPITAL FOR WOMEN AND CHILDREN, PLAISTOW;

AND

A. J. CLARK, M.D., F.R.C.P. LOND.,
PROFESSOR OF PHARMACOLOGY, UNIVERSITY COLLEGE, LONDON.

ON theoretical grounds it can be shown[1] that the effect of heat upon the velocity of a chemical reaction should obey a certain law which can be expressed symbolically as follows:—

$$\log \frac{K_2}{K_1} = \frac{Q}{2} \frac{(T_2 - T_1)}{T_1 T_2}$$

where K_1 and K_2 are the reaction velocities at the absolute temperatures T_1 and T_2 respectively, and Q is a constant.

This is known as the Van't Hoff-Arrhenius law, and has been found in practice to hold good for all chemical reactions.

There are many vital processes which have been shown by various observers to be affected by temperature in accordance with the same law. Barcroft, for instance, found that the dissociation of oxyhæmoglobin, at various temperatures, takes place in agreement with this law, a point of some considerable importance to the animal body, since the increased dissociation of oxyhæmoglobin resulting from the rise of temperature produced by ordinary muscular work provides more free oxygen for the increased needs of the active tissues. The development of the tadpole has been shown by O. Hertwig to follow the same law[2]; phagocytosis is another interesting example, according to Madsen,[3] of the same thing, whilst the law of increased conductivity of a nerve under rise of temperature is well known to everybody.

In a paper by one of us (A. J. C.) upon the effect of temperature on the frequency of the heart,[4] the statement was made: "In both the frog and the rabbit the frequency of the heart is not a linear function of the temperature, nor is it a simple logarithmic function." This statement requires modification, for we find that when numerical results upon which that statement was based are subjected to exact mathematical analysis they are found to obey the Van't Hoff-Arrhenius law in a very satisfactory manner. Thus, in the case of the isolated auricle of the rabbit's heart the figures shown in Table I. were obtained:—

TABLE I.

Temperature (Centigrade)	15	25	30	34	38
Rate (per minute)	25	64	82	120	170

Using the Van't Hoff-Arrhenius formula we get values of Q which range between 13,730 and 16,130, with a mean value of Q = 14,835. The maximum deviation from the mean—i.e., 1295 (viz., 16,130 – 14,835) can be shown by statistical methods[5] to be within the limits of experimental error.

If now we use this value of Q to calculate the theoretical rate of the auricle at the given temperatures, we obtain the figures given in Table II.:—

TABLE II.

Temperature	15	25	30	34	38
Rate { Observed	25	64	82	120	170
{ Calculated	(25)	59·5	89·6	123·4	174·3

It will be seen that the agreement between the calculated and observed results is a very satisfactory one. When the original figures are plotted, the resulting graph is neither a straight line nor a simple logarithmic function, but if we plot the logarithms of the corrected (calculated) figures against temperature the graph is a straight line, as we should expect.

In another set of experiments with the frog's heart (perfused with alkaline Ringer of pH = 9), given in the paper referred to, we find the observed and calculated results at various temperatures to be as shown in Table III.:—

TABLE III.

Temperature	0·4	5·6	6·4	12·8	13·6	14	16	21	29·5
Rate—									
Observed	5·9	11·7	13·25	25·25	26	30	36	52·5	84–92
Calculated	(5·9)	10	12·28	25·89	28·41	29·7	37·9	64·3	156

So that up to a temperature of 20° the agreement is excellent. It is possible that at a higher temperature there is a coagulation or other chemical change of the protoplasm of the frog's heart which accounts for the divergences between the expected and observed results at 21°, and especially at 29·5°. Similarly, it would appear that normal Ringer, with weak buffer ($NaHCO_3$ = 0·015%; pH = 8) has some chemical influence upon the heart muscle, since experiments carried out with isolated frog's heart perfused with that solution give results which are not in agreement with the Van't Hoff-Arrhenius law.

It would be interesting to have exact observations of the normal pulse-rate in man under the normal cyclical daily variations in temperature. Such observations would be of value from the point of view of variations of pulse-rate under various pyrexial conditions, inasmuch as they would enable one to ascertain whether any particular pyrexial condition

has or has not a chemical action upon the protoplasm of the cardiac musculature. This is a point which we hope to investigate in the near future.

Conclusions.

1. The rates of the isolated heart of the frog and rabbit under different temperatures are such as would be expected from the Van't Hoff-Arrhenius law.

2. Within certain ranges of temperature it is possible to foretell by means of that formula what the rate of the heart should be under any particular temperature.

3. Marked divergences between the observed and calculated results—when gross errors of observation can be eliminated—point to some chemical changes in the heart muscle, due either to the high temperature or to nutritive fluid supplying the heart.

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ACIDOSIS IN RELATION TO ACUTE RICKETS.

BY NORMAN BURGESS, B.A. CAMB.,

AND

A. A. OSMAN, M.R.C.S., L.R.C.P.,

CHIEF CLINICAL ASSISTANT, CHILDREN'S DEPARTMENT, GUY'S HOSPITAL.

(*From the Department for Diseases of Children, Guy's Hospital.*)

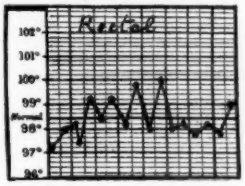
IN view of recent discussion of the nomenclature of this subject it should be stated at the outset that the term acidosis, as used in this preliminary communication, refers to a variation in the acid-base equilibrium in the blood, with a lowered plasma bicarbonate, and not to any particular form of acid intoxication. Evidence has been accumulating, from many sources, that acute rickets is frequently associated with a condition of acidosis, since this was first described by Hertzmann in 1873.[1] The subject has recently been revived by Pritchard[2] and others, who regard acidosis, however produced, as the *essential* factor in the ætiology of this disease. Such a theory appears to be based largely upon determinations of the calcium and phosphorus content of the blood and excreta, together with estimations of the ammonia-nitrogen and the detection of acetone bodies in the urine. So far as we have been able to ascertain, no direct measurements of the alkaline reserve of the blood in acute rickets have yet been published; we have recently had the opportunity of making such investigations, together with observations on the urine and fæces in three cases of acute rickets, and believe, therefore, that the publication of a preliminary communication embodying our results, few as they are, may be of value to other workers in this field.

Notes of Cases.

On account of the difficulty of obtaining a precise definition of a condition so protean in its manifestations as acute rickets, and realising that the title is ambiguous, it has been deemed advisable to give a somewhat detailed clinical description of the cases studied.

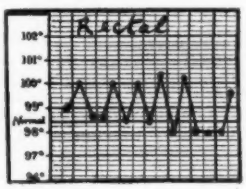
CASE 1.—Female, aged 3, a full-time child weighing 6½ lb. at birth. Entirely breast-fed and weaned at 13 months. Had measles at 2 years, after which she walked badly and "fell about." Home situated in a very poor neighbourhood, the total family income (parents and two children) being 22*s.* per week. For the past 18 months the average diet consisted of:—Breakfast: bread, margarine, tea, and occasionally an egg; dinner: always some kind of meat, potatoes, and greens, and sometimes a rice pudding; tea: bread and margarine. In June, 1923, she was noticed to be very fretful and listless and began to sweat more than usual. She was admitted to hospital on July 9th, 1923, under Dr. H. C. Cameron, as a case of acute rickets. The most striking clinical feature was the extreme hypotonia of the limbs and musculature generally. There was slight pyrexia (Chart 1) but no obvious anæmia. The spleen was not palpable. Beading of the ribs was marked, and there was considerable enlargement of the wrists and ankles; bowing of the tibiæ was also present. X ray examination of the epiphyses showed cupping, and the typical appearance of acute or florid rickets. The child was placed in a cot so situated that she was not in direct sunlight, and was put on light full diet, comprising bread, butter, milk, potatoes, green vegetables, cooked meat, rice pudding made with milk, and water as required. No cod-liver oil or other medicine was given.

FIG. 1.



Case 1.—Temperature chart, July 9th–16th.

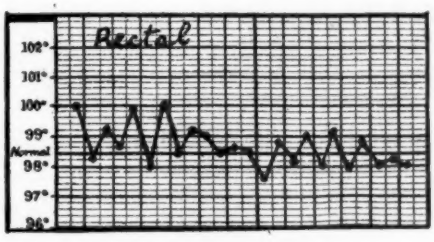
FIG. 2.



Case 2.—Temperature chart, July 9th–16th.

CASE 2.—Female, aged 18 months, sister of Case 1, living under the same home conditions, and on practically the same diet. No history of any previous illnesses. Symptoms the same as in Case 1, and began about the same time. On admission on July 9th, 1923, the chief feature was the extreme hypotonia. There was slight pyrexia (Chart 2). Clinically, there was no difference between the two cases as regards the severity of the process, but X ray examination showed slightly less bony change in Case 2. She was placed in an adjacent cot, and on the same diet as her sister, and was not given cod-liver oil or other medicine.

FIG. 3.



Case 3.—Temperature chart, August 29th–Sept. 10th.

CASE 3.—Male, aged 1 year and 8 months, the youngest of three children. A full-time child, breast-fed for three months, then given cows' milk and barley-water. For the last seven months he had been having a diet as follows:—Breakfast: bread, margarine, sugar, and jam; cows' milk 1 pint per diem; dinner: mashed potatoes, gravy, rice; tea: milk, bread, and margarine. Had been crawling about for some time, but does not stand or talk. It was not possible to determine the date of onset of the symptoms. Anterior fontanelle still patent; marked beading of ribs, and enlargement of wrists and ankles. As in Cases 1 and 2, the most striking feature was the extreme hypotonia. Slight pyrexia (see Chart 3). X ray examination showed advanced rickety changes and cupping of about the same degree as Case 1. This case was in hospital on the same diet as the two previous cases, and was not given cod-liver oil or other medicine. The investigations were carried out 24 hours after admission.

The cases were confined to bed throughout the period under review.

We wish to emphasise the "acuteness" of the process in the above cases, and as this stage probably

only lasts for a comparatively short period, a few weeks at the most, it is important that observations such as are recorded here should be undertaken quite early in the disease.

*Investigations and Methods.**

The investigations carried out comprised determinations of the bicarbonate content of the plasma from venous blood, and in Case 3 the acetone bodies in the blood. Quantitative estimations were made of the total acetone bodies and the ammonia-nitrogen ratio in the urine. Special precautions were taken in collecting the specimens to ensure that no ammonia should be introduced from without. The specimens were collected into sterile and specially cleaned bottles. Bacteriological examination of the specimens remained sterile up to 72 hours. In Case 3 the percentage of fat in the fæces was determined. The plasma bicarbonate values were obtained by the titration method of Van Slyke, Stillman, and Cullen[3] the full precautions indicated in their paper being carried out. Instead, however, of determining the reaction of each sample of blood taken, the titration was made to a constant end-point pH 7·4. The results are expressed as molar concentration of bicarbonate, each figure being the average of at least two readings. The total acetone bodies in the blood were estimated by the method of Van Slyke and Fitz.[4]

The total acetone bodies in the urine were determined by the method of Van Slyke,[5] the mercuric precipitate being dissolved in dilute hydrochloric acid and titrated with potassium iodide as described in his paper. The results are expressed as molecular concentration of acetone. The ammonia-nitrogen was determined by formol titration: the fat content of the fæces by the Schmidt-Werner method (as used by Cammidge).

Control observations were carried out both on blood and urine of other children in the ward convalescent from various disorders other than rickets. Unfortunately, the control figures for blood and urine were not obtained from the same cases. Both Cases 1 and 2 were in hospital for three days before observations were commenced.

Results.

Blood.—The values obtained for the plasma bicarbonate were: Case 1, 0·0174; Case 2, 0·0190; Case 3, 0·0183. The average value in the controls was 0·0313, which approximates very closely to the figure obtained with this method in a larger series of normal adults—viz., 0·0345 (males) and 0·0319 (females). A further determination on Case 1 after a period of 11 days, during which time the acetone bodies had disappeared from the urine, gave a value $NaHCO_3 = 0{\cdot}0166$.

It is unfortunate that the figures obtained are so few, but it is scarcely possible to obtain repeated samples of blood from young children whilst observing all the precautions necessary for accurate work with this method. In Case 3 the blood withdrawn at the same time as the sample on which the plasma bicarbonate determination was carried out was examined for acetone bodies. They were found to be entirely absent from the blood.

Urine.—In Case 1, on the first two days of investigation, the urine gave a strong Legal reaction for acetone bodies, but the ferric chloride reaction was negative. A quantitative estimation of the acetone bodies was only carried out on the first day, as it was impossible to obtain a sufficiently large specimen on the second day. The value on the first day was 0·0096. No acetone bodies were present in the urine of Case 1 after the second day. In Case 2 the difficulty of obtaining specimens was much greater. Only on two occasions could a sufficient quantity be obtained. These contained no acetone bodies. No acetone bodies were present in the urine of the control cases. In the cases under consideration the average NH_3/N_2 ratio was 14·3 per cent. In a series of controls the average value was 7·04 per cent. These figures for the NH_3/N_2 ratio correspond approximately with those obtained by Dr. Amy Hodgson,[7] who obtained an average NH_3/N_2 ratio of 14·3 per cent. in 13 cases of rickets, as compared with 6·2 per cent. in a series of normal children. The results are expressed below in tabular form so that the dates on which determinations were made can be clearly seen and compared.

Case.	Date in 1923	$NaHCO_3$.	NH_3/N_2 per cent.	Acetone in urine.	FeCl.	Legal.	Roths.
1.	12/7	0·0174	14·1	0·0096	−ve	++ve	++ve
	13/7		13·8		−ve	++ve	++ve
	16/7		11·9	Nil.	−ve	−ve	−ve
	23/7	0·0166		,,	−ve	−ve	−ve
2.	12/7	0·0190		,,	−ve	−ve	−ve
	14/7		14·1	,,	−ve	−ve	−ve
3.	30/8	0·0183	17·6	,,	−ve	−ve	−ve

Fæces.—The fæces of Case 3 contained 17·5 per cent. of fat. The following report on the fæces of Case 1 was made by Dr. J. H. Ryffel: "Fæces are loose. Acid to litmus, not to Congo-red. No appreciable excess of fat. Stain blue with iodine, staining being due to granules which look more like yeasts than starch grains."

Discussion of Results.

The results recorded above, although few in number, by their variety and in comparison with the results of other workers, indicate a line of research which we shall hope to pursue when further material becomes available. The results of determinations of the plasma bicarbonate and acetone bodies in the blood and urine form an interesting comparison with figures recently obtained in a series of cases of diabetes mellitus.[8] In the latter cases it was found that the diminution of the plasma bicarbonate corresponded fairly closely with the total acetone bodies present in the blood; this, as we have shown, is far from being the case in acute rickets, although in each case there was marked diminution in the alkali reserve. In two out of the three cases no acetone bodies were present, while in the other case, although the plasma bicarbonate was still lower 11 days after the first observations were made, the ketosis disappeared after four days and did not reappear. So far our results would tend to show that there is a severe acidosis in acute rickets in which the acetone bodies play no part. This would lead to the conclusion that the acidosis is due to one or both of the following factors: (1) Loss of bases by some other channel—e.g., fæces or urine; (2) some other acid bodies present in the blood. With regard to the former, Dodds[9] records a high fat content in the fæces of children suffering from acute rickets, and concludes that there is evidence of pancreatic disorder in acute rickets. Braithwaite[10] however, was unable to confirm this result, and points out that Dodds neither defined the term acute rickets nor stated in his article whether the cases were having cod-liver oil and malt as part of their treatment. In Case 3, in which we determined the percentage of fat in the fæces, our results were in agreement with those of Braithwaite, since we obtained a normal figure. Dr. Ryffel's report on the fæces in Case 1 seems to point in the same direction. The second point—viz., whether there are other acid bodies circulating in the blood, thus causing a depletion of the alkaline reserve, is at present a matter of pure conjecture.

In conclusion, we wish to express our thanks to Dr. H. C. Cameron for permitting us to investigate his cases, to Dr. W. W. Payne and Dr. E. P. Poulton for kindly help and criticism, and to Dr. J. H. Ryffel for placing the resources of his laboratory at our disposal. One of us (N. B.) wishes to acknowledge with thanks a grant from the Parsons Research Fund.

(*Continued at foot of next page.*)

* It may be of interest to note that the weather during the course of the investigations of Cases 1 and 2 was extremely hot, the shade temperature (ward) at the time the first two blood samples were taken being 82° F.

BACKACHE.*

BY R. H. PARAMORE, M.D. LOND., F.R.C.S. ENG.,
GYNÆCOLOGIST, HOSPITAL ST. CROSS, RUGBY.

BACKACHE is such a common complaint, is associated with so many different conditions, receives as a rule such scant consideration, that no apology is needed for bringing it forward for discussion. Straub[1] states that it is not only one of the commonest complaints, but that, "ætiologically considered, it is one of the most difficult to deal with," and that "in no field of medicine is there greater ignorance as to .... cause and conditions."

I turn to Lovett's[2] paper of 1914, a paper full of interest, for the introduction to my argument. Lovett dealt with chronic backache; the following is a slightly modified form of his classification:—

Backache: Lovett's Classification (1914), Modified.

1. *Gynæcological: Disease or Displacement.*
   (*a*) Direct reflex influence.
   (*b*) Flexed position of body = Fatigue or strain of erector muscles.
2. *Traumatic.*
   (*a*) Arthritis of spine.
   (*b*) Defective balance = Fatigue or strain of erector muscles.
3. *Arthritis of Spine.*
   (*a*) Stimulation of pain fibres.
   (*b*) ? Lowered resistance of body = Fatigue or strain of erector muscles.
4. *Other Local Origin.*
   (A) Static in origin.
   (*a*) Skeletal peculiarities: shortness of one leg, body inclined sideways.†
   (*b*) Lack of proper muscular control—
   "Slumped attitude" } Body inclined forwards.†
   ? Flat-foot }
   (*c*) Abnormal conditions of abdomen—
   Corpulence } Body inclined backwards.†
   (Advanced pregnancy) }
   (B) Sacro-iliac joint—
   (*a*) Strain of—Attitudinal.†
   (*b*) Relaxation of—Non-proven.‡

† Fatigue of erector spinæ muscles.
‡ It must be left to orthopædists to decide whether this opinion stands to-day.

Lovett left out many conditions in which backache may be complained of—caries, cancer, hydatid of the spine, aneurysm, pneumonia, pleurisy, renal calculus, nephromata, gall-stones, appendicitis, ovarian tumours, fibroids, cancer of the womb, nephroptosis, organic nervous disease, small-pox, and influenza. But by excluding all these he emphasises the great rôle played by fatigue of the back muscles in the causation of backache in the types he considers. It therefore seemed advisable to get at the cause of this fatigue of the erectors, and, as a corset was nearly always found to benefit the patient greatly, to ascertain the way in which the corset acts. Flat-foot and similar conditions, according to Lovett, occasion backache by inducing disturbance in antero-posterior balance.

Backache and the Erector Spinæ Muscles.

Two questions then arise: First, how can flat-foot per se cause backache? Does it occasion strain of the erector muscles; and, if so, how? Secondly, is backache, in the types of case mentioned, due to strain or fatigue of the erector muscles; and, if so, how is it that the therapeutic corset relieves? If backache of these types is not due to strain of the erector spinæ muscles, to what is it due? I address myself to the second of these questions, leaving the first to the orthopædist and to the general practitioner. It seems to me, however, that the flat-foot and backache, which apparently appear so often in conjunction, are due to a common cause—a general bodily weakness or depression of the vital forces. Flat-foot must be attributed to a general depression; or, if purely local, it must have some special cause. It is a result of too much strain on the tibialis posticus and allied muscles; but why should these become incapable of performing their function efficiently, if the general resistance of the individual is not depreciated and the bodily vigour remains good? I consider it significant that in a patient with flat-feet mentioned by Lovett, complete freedom from backache did not occur until a corset was applied. The fact that omission to wear the foot-plates was marked by a return of the backache which disappeared with their renewal is interesting, and essentially an orthopædic question. The effect of the corset, applied especially to the lower abdomen, is what interests me; my argument is that it favourably affects general metabolism and thus not only relieves strain of the erector muscles but assists in the performance of function by all body parts, and thus materially participates in the recuperation of such a condition as flat-foot.

Leaving aside for a moment Lovett's defect in lateral balance, it is rather interesting to observe that he depicts two different types of defect in antero-posterior balance. On the one hand, he attributes the backache of gynæcological disease and of "slumped attitude" to the patient inclining the body forwards; and on the other, the backache of corpulent people to the enlargement of the abdomen, in which case the body is inclined backwards. These two attitudes are essentially different in one particular: in the former, owing to the flexion of the spine, the erector muscles are extended—lengthened—stretched; in the latter, owing to the extension of the spine, the erector muscles are almost as short as they can be. In the former case, in spite of their extended state, they have to contract more strongly than if the individual were erect—and it is not surprising that under such conditions they should become easily fatigued. Backache is perhaps most readily induced in normal healthy man by his working in an unaccustomed stooping position; how often does one hear of patients being afflicted with lumbago after digging in the garden! You will see at once that the erector muscles are maintained unduly stretched by the attitude, but that at the same time they must work harder, contract more strongly, than during such an exercise as walking. In the other type of case—that of a corpulent man or that of a woman in advanced pregnancy—though the protrusion of the abdomen carries the centre of gravity forwards, the shoulders are thrust back, so that an equipoise is obtained. To maintain the shoulders back, to carry the trunk and head erect, the erector muscles must surely do more work than in a healthy non-corpulent or non-pregnant individual.

Is this, then, the cause of the backache in these cases? That it is so seems indicated by a case of defect in lateral balance, cited by Lovett; with an inch shortening of one leg, the patient complained of backache and was cured by a high sole on the boot of the shorter leg. In this case the backache can only have been due to the extra work thrown on the erector spinæ, which had to do its work in a stretched

* Read at a meeting of the Rugby and District Medical Society, Dec. 1st, 1923.

[1] Straub: The Diagnosis of Conditions Causing Backache, Jour. Amer. Med. Assoc., 1923, vol. lxxx., 674.

[2] Lovett: The Causes and Treatment of Chronic Backache, Jour. Amer. Med. Assoc., 1914, vol. lxii., 1615.

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(*Continued from previous page.*)

1. Hertzmann: See Medical Research Council Reports: Studies of Rickets in Vienna, 1919–1922. Special Reports No. 77.
2. Pritchard, E.: Brit. Med. Jour., 1923, i., 887.
3. Van Slyke, Stillman, and Cullen: Jour. Biol. Chem., 1919, xxxviii., 167.
4. Van Slyke and Fitz: Ibid., 1917, xxxii., 495.
5. Van Slyke: Ibid., 1917, xxxii., 455.
6. Cook, F., and Osman, A. A.: Guy's Hosp. Rep., No. 2, April, 1923, lxxiii., 233.
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8. Burgess, N., Campbell, J. M. H., Osman, Payne, W. W., and Poulton, E. P.: Ibid., 1923, ii., 777.
9. Dodds, E. C.: Brit. Med. Jour., 1922, i., 511.
10. Braithwaite, J. V. C.: Ibid., 1922, i., 739.

state because of the lateral deviation of the spine which the condition determined. But if we accept this as a cause of the backache in this case, and attribute the backache in corpulent people to the increased strain on the erector muscles, we are immediately met with a difficulty. If the erector muscles, because of the attitude, have to work harder—if the backache in these cases is due to the extra strain thrown on these muscles—why do they not hypertrophy, and by increasing in mass, become able to deal with the situation?

The Basis of Muscle Hypertrophy.

Nothing in medicine is more fascinating than the study of the reactions of muscle. Life is simply a series of postures and movements; to understand these is to understand all. A consideration of the mechanism of muscle hypertrophy—of the determining and opposing factors—throws much light on many vital processes. One of the important features to remember is that an increase in work is not the only factor brought into play; besides the demand for an increase in contractions—tonic and other—an increased blood supply is necessary. This is required not only to ensure an adequate oxygen and foodstuff supply, but especially for the removal of the katabolic products, now increased. Similarly, the blood must be of a certain quality—it must not already be laden with too great a percentage of waste products, nor must it be deficient in those bodies on which anabolism depends. In short, the visceral machinery must be in such a state that it can not only furnish an adequate amount of blood per unit of time to the tissue in question, but of blood of adequate quality. To effect this it must be working at less than top speed—that is to say, it must be in such a state that it can respond to the needs of the moment, to the increasing demands now made on it; and, if these persist, can itself hypertrophy. In people with lax abdominal walls—whether corpulent or not—and in certain cases of pregnancy this machinery is not at its best: the conditions for hypertrophy do not sufficiently obtain, organs have to do more work than they can, strains thus accrue when they should not, and fatigue is experienced sooner than it ought.

The Working of Intra-Abdominal Pressure.

A word as to how this intra-abdominal pressure works—the pressure due to the contractile activities of the abdominal muscles, especially of the flank muscles, acting as they do in concert with the thoracic diaphragm and pelvic floor. This pressure works in two ways. How it affects the visceral capillary circulation, the flow of blood per unit of time through the stomach and intestines, the pancreas and spleen, the liver and kidneys: how it tends to flatten the visceral capillaries and conversely occasions reflexly a corresponding dilatation of the supplying visceral arterioles (other forces remaining the same) are questions with which space will not permit me to deal. I wish, on this occasion, to emphasise the other more obvious effect of the intra-abdominal pressure, its effect on the heart—that is, on the output from the left ventricle—and its effect, consequently, on the aortic blood pressure. The intra-abdominal pressure has this effect by controlling or influencing the supply of blood to the heart (right auricle). If the supply of blood to the heart is poor, the output must correspond, so must the aortic pressure. There are only three regions—omitting the skin and subcutaneous tissues—from which blood is returned to the heart (right auricle): these are the skull, the limbs, and the abdomen. Owing to the nature of the skull, blood cannot accumulate within this part. The limb muscles, too, are invested with inextensible aponeurotic membranes, so that blood cannot accumulate to any extent in the limbs. But in the abdomen it is different; there great variations in volume and capacity are constantly occurring, and with lax abdominal walls, blood can readily accumulate. By applying an efficient corset or belt the pressure within is raised, the blood can less readily accumulate, more per unit of time is pressed into the thorax and right auricle, reaches the left ventricle, and is thrust into the aorta. The aortic blood pressure thus rises, more blood per unit of time thus traverses the brain, the limb muscles and back muscles, the viscera of the abdomen. The whole individual becomes improved; muscles or glands or other parts, which before could not hypertrophy in spite of increasing demands made upon them, find themselves now able to deal with the situation in hand. The tonic contraction of muscle is greater, the cerebral response is enhanced, gland activity is increased—the neurasthenic gets well. It is not surprising that, if backache in the cases mentioned is due to fatigue spasm or strain of the erector muscles, such a measure should relieve the condition. The success of the treatment is an indication of the soundness of the explanation, and if it is applied in practice most gratifying results will be obtained.

Surgical Treatment of Backache.

So much for the academic consideration of backache. I have already taken up so much of your time that I do not intend to discuss at length the cases of backache which have come under my care, but before I close I should like to say something about the surgical treatment of backache. By this I do not allude to those measures orthopædists may practise, such as stretching the gastrocnemii, and such like; nor am I thinking of those operations by which the backache incident to inflammatory or other disease of the pelvic viscera is cured or relieved, or of the effect of nephropexy in this respect; I am thinking of specific conditions of the abdominal wall and of the pelvic floor, in virtue of which "static backache" arises, and of procedures by which the functions of these important musculatures can to a very large extent and in some cases completely be restored to normal.

It is clear, if the abdominal wall be lax, that a corset or belt, however well it fit, can only be effective in raising the intra-abdominal pressure if the pressure-resisting mechanism occluding the pelvic outlet be efficient. In patients suffering from so-called relaxed vaginal outlet, a condition in which the pelvic floor musculature is not efficient and does not act as the sphincter it should, the application of a corset or belt will only tend to make worse the backache and bearing-down pains, of which the patient complains or exaggerate the visceral extrusion which may already exist. To cure the patient, the pelvic floor itself must first be restored and the genital extrusion prevented. But lesions of the abdominal wall and pelvic floor, the common results of pregnancy and parturition respectively, are not always coexistent. Even in multiparous woman, with a markedly lax abdominal wall, one may yet find the pelvic floor in good condition and the vaginal orifice tightly screwed up. In such a case, attention to the abdominal wall alone is needed. On the other hand, it is frequent to find with a lax abdomen a lax or inefficient pelvic floor.

In practice I divide these patients into two classes according to their age, according as to whether or not they have passed the climacteric. After the climacteric, when the uterus is of no further service, and if malignancy can be confidently excluded, the interposition operation is best. The cervix is amputated, and the body of the uterus brought down and fixed beneath the bladder, between it and the anterior vaginal wall. In this position it acts as a natural pessary and cures effectually the cystocele so common in these cases and the incontinence of urine from which so many of the patients suffer. In younger women the ideal is to restore the displaced levator muscle to its proper position. During birth the muscle border is always more or less torn from its bony origin in front, and during the lying-in it takes up a more lateral anterior attachment, becoming more oblique. This change in position, which can readily be demonstrated clinically, results in a permanent widening of the pelvic floor aperture, and in marked cases is commonly associated with incapacitating bearing-down pains and

backache and the imminence of prolapse. The operation I have been practising, and from which I have been obtaining some good results, consists in exposing the muscle, severing it from its present more or less lateral attachment, and uniting it by sutures to the pubic arch near the middle line. By this means—if the new attachment persists—the pelvic floor aperture is much narrowed and the muscle becomes again efficient as a sphincter to the pelvis. In cases in which this has been done, and in which the abdominal wall is lax, a belt can now be worn with much advantage.

Inefficiency of the Abdominal Wall.

In other cases one finds the abdominal wall hopelessly inefficient. Examples of two types of case have come before me. In one, the linea alba is greatly stretched and remains so or gradually gets worse; in the other, the conspicuous feature is not a persistent separation of the recti, but marked laxness of the flank muscles outside. Examination of the abdominal wall in strained conditions brings out these features. By getting the patient when lying supine to raise the head and shoulders, the separation of the recti, if present, becomes clearly evident; whilst if a weakness of the flank muscles is the feature of the case, one can see these bulge at times extraordinarily. In such cases, the application of a corset or belt cannot hope to restore the function—if a belt be used the redundant abdominal wall rolls over it in an annoying fashion—but much benefit may accrue from surgical measures. I cite you two examples:—

A corpulent woman of 45, the mother of ten children, the last 5 years of age, consulted me complaining of backache. There was considerable separation of the recti, three or four inches at the level of the navel; the pelvic floor aperture was not much enlarged, but a small rectocele was present. On April 30th, 1923, I exposed the stretched aponeurosis between the recti in the whole of its extent, and pleated it longitudinally, so that at the end of the operation the separation was gone. A small colpo-perineorrhaphy was done at the same time. On Oct. 23rd the patient reported; she said she was "ever so well," she had had no further backache or bearing-down pains. The incision in the abdominal wall was then 13 in. long, and the girth of the abdomen 46½ in.

The other case is that of a woman who has suffered much at my hands:—

The patient is 57 years of age. Four years ago I removed the uterus for bleeding due to fibroids. In spite of wearing an abdominal belt from her convalescence, in about six months' time she complained of bad pain in her back and right thigh. Examination revealed considerable prolapse of the right kidney, which was stitched up in October, 1920. She got on fairly well until the spring of 1922, when backache was again a cause of complaint. I thought the pelvic floor was slackening and advised a pessary and a larger pad to the Curtis support. This relieved for a while, but at the end of that year the patient complained of a "dreadful pain" in the back "and through to the front." She stated she was always in pain, "could not sleep or lie still in bed," and "could not sit for many minutes in one position."

The abdominal wall was exceedingly lax, especially laterally; and on the left side in the region of the anterior superior spine of the ilium a hernia seemed present. Examination revealed the pelvic floor aperture in a fairly good condition; the pessary apparently had done some good. At my wits' end to know what to do for this patient, who was constantly coming to see me, I determined to advise doing a modified Lotheissen's operation on both sides—that is to say, bringing down the lower edge of the transversalis and internal oblique and stitching them to the ascending ramus of the pubes. This was done on both sides on Feb. 19th, 1923, a hernial protrusion being found on the left side as previously indicated. Unhappily, on coming out of the anæsthetic, the patient was found to be suffering from hemiplegia—evidently due to a cerebral thrombosis. She gradually recovered from this, and quite early in her convalescence stated that her backache had gone. Writing nine weeks after operation, she said: "I have not had any pain either in my back or at my front and I begin to feel much better than I have done for several years."

This would have been a good case had the patient remained well. Unfortunately, she has had two further attacks of thrombosis, or of what seemed to be thrombosis, from the last of which she is only now recovering. The first of these kept her in bed less than ten days; and now she wants to get up before a week is out. But she persists in stating her backache is gone, though pain in the right thigh continues.

Believing, as I firmly do, in the benefits which by surgery we can confer on humanity, and especially in those mechanical measures by which backache can be successfully dealt with, the question at times arises when plastic procedures have been done and the patient gets well and the old pain goes, whether the wish had not something to do with the thought—whether ceremonials are not after all of value. In many cases there is no doubt; the change in structure effected, demonstrable to one's senses, explains the altered outlook of the patient. It is true that the abdominal wall in this patient of mine had become greatly improved; in spite of that, and if she previously had backache (as I believe), I can only describe its relief by surgery as magical.

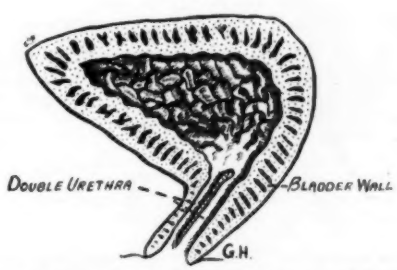
ANATOMICAL ABNORMALITIES.

BY GORDON HARROWER, M.B., CH.B. GLASG.,
PROFESSOR OF ANATOMY, KING EDWARD VII. MEDICAL COLLEGE, SINGAPORE.

DURING the spring term of 1923 a remarkable series of abnormalities came under my observation at the anatomy department of the King Edward VII. Medical College, Singapore. The subjects for dissection are drawn from the coolie class of Chinese, with occasionally a Tamil coolie. Female subjects are very difficult to obtain, as there is a minority of women of all nationalities in Singapore.

CASE 1.—The most noteworthy abnormality, one which I have not seen previously reported, occurred in a female Tamil subject. On making the usual median incision through the pelvic viscera the knife divided the urethra in its entire length, displaying a double channel with double opening into the bladder, and a single external urethral orifice. The urethra was divided by a very thin septum (Fig. 1), having a uniform thickness of 1 mm. in its entire

FIG. 1.



Case 1.—Double urethra, divided by a thin septum (width 1 mm.) along almost its entire length.

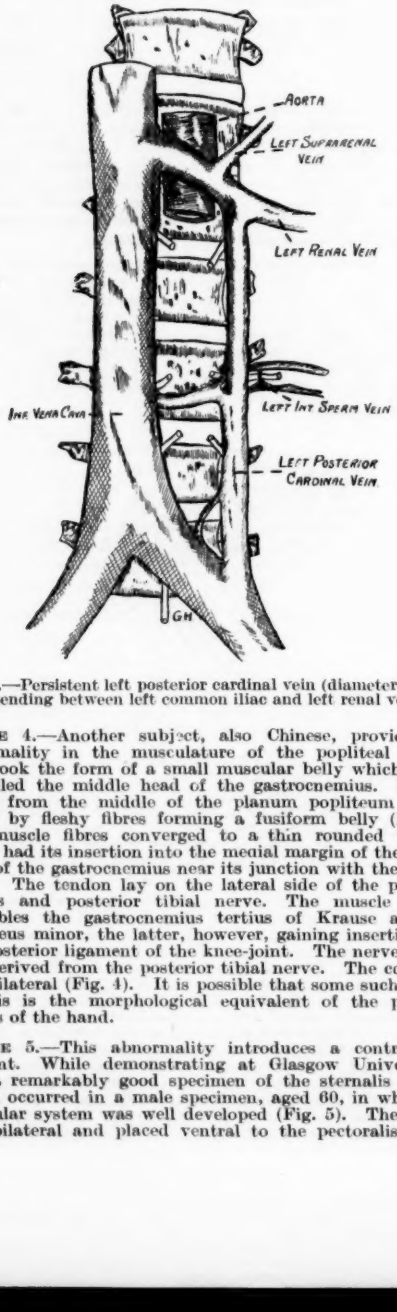
length except near the internal urethral orifice, where it was slightly enlarged and measured 3 mm. The condition at first sight appeared artificially produced, but scrapings were taken from each canal and examined under the microscope. Both canals were found to be lined by squamous epithelium. The internal urethral orifice of each canal was depressed, and the mucous membrane formed a ridge round each opening.

CASE 2.—In an adult male Chinese a persistent left posterior cardinal vein was found (Fig. 2). The vein extended between the left common iliac vein and the left renal vein, and measured 8 mm. in diameter. The vessel lay along the left antero-lateral border of the vertebral column, and received the lower three lumbar and internal spermatic veins of the left side. The corresponding lumbar arteries passed posterior to the cardinal vein. The upper extremity of the vessel opened into the left renal, 3½ cm. from the medial border of the left kidney. At the lower end a small communicating vessel passed between the posterior cardinal and the left common iliac. The left internal spermatic opened into the left border of the left posterior cardinal near its middle, and at the same level a small communicating vessel passed to the inferior vena cava.

From its position, relations, and tributaries the vessel is obviously a persistence of the lower part of the posterior cardinal of the embryo.

CASE 3.—In this subject my attention was drawn to the remarkably small calibre of the ascending colon and the absence of cæcum and appendix. On examination, however, I found that the cæcum occupied the position of the normal hepatic flexure. The cæcum lay in a horizontal position with its apex directed to the right. The appendix was turned upwards and to the left behind the cæcum. The position of the ascending colon was occupied by the terminal portion of the ileum, which had no mesentery, but had the same peritoneal relations as the normal ascending colon. There was a large retrocæcal pouch. This condition represents a failure in descent of the cæcum to the right iliac fossa after the rotation of the gut from the left iliac fossa to the right hypochondrium. In a similar case which came under my notice some years ago an inflammatory condition in the right hypochondrium, diagnosed as hepatic abscess, proved to be appendicitis.

FIG. 2.

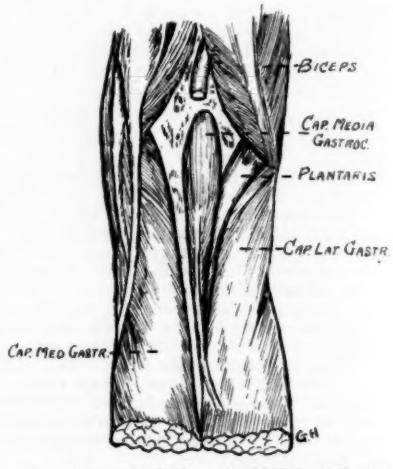


Case 2.—Persistent left posterior cardinal vein (diameter 8 mm.) extending between left common iliac and left renal veins.

CASE 4.—Another subject, also Chinese, provided an abnormality in the musculature of the popliteal region. This took the form of a small muscular belly which might be called the middle head of the gastrocnemius. It took origin from the middle of the planum popliteum of the femur by fleshy fibres forming a fusiform belly (Fig. 3). The muscle fibres converged to a thin rounded tendon, which had its insertion into the medial margin of the lateral head of the gastrocnemius near its junction with the medial head. The tendon lay on the lateral side of the popliteal vessels and posterior tibial nerve. The muscle closely resembles the gastrocnemius tertius of Krause and the popliteus minor, the latter, however, gaining insertion into the posterior ligament of the knee-joint. The nerve supply was derived from the posterior tibial nerve. The condition was bilateral (Fig. 4). It is possible that some such muscle as this is the morphological equivalent of the palmaris longus of the hand.

CASE 5.—This abnormality introduces a controversial element. While demonstrating at Glasgow University I had a remarkably good specimen of the sternalis muscle, which occurred in a male specimen, aged 60, in whom the muscular system was well developed (Fig. 5). The muscle was bilateral and placed ventral to the pectoralis major. It took origin from the costal cartilages of the fourth to the seventh ribs and the adjacent half of the anterior surface of the sternum, a few of the fibres being in direct continuity with the fibres of the rectus abdominis. The muscular belly ended above in a stout tendon directly continuous

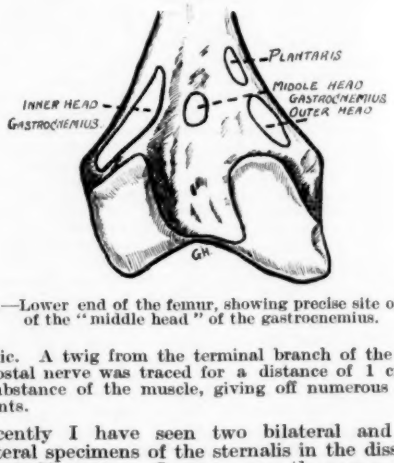
FIG. 3.



Case 4.—A small muscular belly or "middle head" of the gastrocnemius took origin from the middle of the planum popliteum of the femur in both legs.

with the sternal tendon of the sterno-mastoid, while a thin lateral expansion was attached to the medial end of the anterior surface of the clavicle. The right sternalis measured 4 cm. in breadth and 1 cm. in thickness, the left measuring 3·5 and 0·8 cm. respectively. The measurements were taken in the preserved condition. Unfortunately the nerve supply of the muscle was not definitely ascertained, although the muscle was pierced by the anterior terminal branches of the second to the sixth intercostal nerves. Since then I have observed four bilateral and three unilateral specimens at Glasgow, but in every case except one—the specimens being dissecting-room subjects—the possibility of a nerve supply from the external anterior thoracic nerve could not be excluded. In the exceptional case the muscle was observed early, and Dr. John Morton, lately demonstrator at Glasgow University, made an extremely neat and careful dissection. The specimen in this case was poorly developed, but there was no nerve supply from the external anterior

FIG. 4.



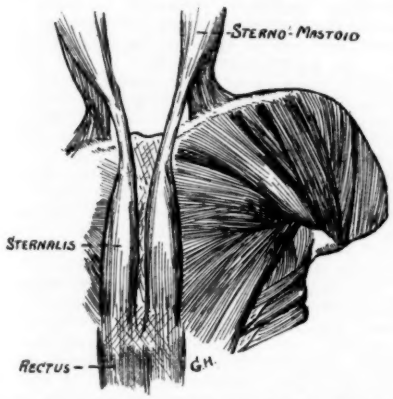
Case 4.—Lower end of the femur, showing precise site of origin of the "middle head" of the gastrocnemius.

thoracic. A twig from the terminal branch of the second intercostal nerve was traced for a distance of 1 cm. into the substance of the muscle, giving off numerous slender filaments.

Recently I have seen two bilateral and three unilateral specimens of the sternalis in the dissecting room at Singapore. In two cases the nerve supply was not definitely ascertained. In one, where the muscle was very poorly developed, the muscle fibres

ended in a thin aponeurosis, which passed laterally to blend with the fascia covering the pectoralis major, a few tendinous fibres crossing the middle line to blend with the aponeurosis of its fellow. In this case the muscle had a fine twig from the external anterior thoracic nerve. In the other two cases in which the muscle was observed early enough to permit of careful dissection for the nerve supply, the muscles were more definitely vertical in direction, and in each case they were continuous with the sterno-mastoid. In one specimen the third intercostal nerve before piercing the muscle gave off a fine twig which ended in minute ramifications in the substance of the muscle. In the other case the second and third intercostal nerves gave off similar twigs, which

FIG. 5.



CASE 5.—Bilateral sternalis muscle in a male, placed ventral to the pectoralis major, taking origin from costal cartilages of fourth to seventh ribs and adjacent half of anterior surface of sternum. A few fibres were in direct continuity with fibres of the rectus abdominis; above the muscular tendon was directly continuous with the fibres of the sterno-mastoid.

ended in the substance of the muscle. Neither specimen had a nerve supply from any other source. The specimen figured in the diagram was the largest I have seen.

Considerable difference of opinion exists regarding the morphological significance of the sternalis muscle, and volumes have been written concerning it. To state the matter briefly, one authority holds that the sternalis is derived from the pectoralis major and shares its nerve supply. Indeed, when the muscle is present there is frequently a deficiency in the pectoral muscle. Others consider that it is part of the pubo-hyoid system, and therefore supplied by the intercostal nerves. In support of this theory is the fact in some animals the rectus abdominis extends to the first costal arch. I have seen the rectus extend as far up as the third costal cartilage in the human subject. Another authority considers it a part of the panniculus carnosus.

It is more than five years since I first directed my attention to the sternalis muscle, and I have seen most of the literature on the subject. From the specimens which have come under my notice it appears to me that there are two separate and distinct varieties of abnormality in this region. One variety, the sternalis proper, is supplied by the intercostal nerves and is morphologically continuous with the rectus abdominis. The other variety is developed from the pectoralis major and has a similar nerve supply to that muscle. This variety I propose should be called the sterno-pectoralis. Its nerve supply is a long slender twig from the external anterior thoracic nerve which pierces the pectoralis major to enter the deep surface of the abnormal muscle. It is a remarkable fact that this variety is present in 50 per cent. of anencephalic fœtuses.

Medical Societies.

ROYAL SOCIETY OF MEDICINE.

SECTION OF OTOLOGY.

A MEETING of this section was held on Feb. 2nd, when the chair was occupied by Mr. SYDNEY SCOTT, President of the section.

SURGERY OF SUPPURATIVE AND CERTAIN NON-SUPPURATIVE AFFECTIONS OF THE LABYRINTH.

Sir WILLIAM MILLIGAN (Manchester) read a paper on this subject. He said the clinical picture presented by disease of the labyrinth varied with the segment of the internal ear involved—whether the static or the dynamic segment, or a combination of both. Disease of one segment did not necessarily mean involvement of the other too, therefore any surgical measure should be designed to cause the least interference with the non-infected or only partially affected area. When the cochlear segment was involved there was nerve deafness and persistent tinnitus; when the disease was in the vestibulo-canalicular system the patient had vertigo, disturbances of equilibrium, nystagmus, nausea, or even sickness. Purulent discharge of internal ear might result from the spread of a septic process from the base of the brain via the internal auditory meatus and the sheaths of auditory or facial nerve. Or extradural or subdural abscess might cause the eminentia arcuata to become eroded and afford an entrance for organisms into the superior semi-circular canal, and thus the infection might become diffuse. But the most frequent route was by way of the middle ear following erosion of a portion of its inner wall or capsule of the labyrinth. This he considered resulted mostly from chronic infective disease of the middle ear. When labyrinthitis was due to acute purulent otitis media it was practically always an induced serous labyrinthitis. In circumscribed labyrinthitis, he contended, the most frequent portal was an erosion of the external semi-circular canal. The diffuse form originated in the fenestra ovalis. In cases of tuberculous otitis media in which the disease had subsequently spread to the internal ear, the pars promontoria was frequently destroyed and so opened up a wide invasion portal. The organismal invasion, he thought, was a question of defective drainage, due to a number of causes.

Clinical Types of Labyrinthitis.

The types of labyrinthitis met with clinically were three: circumscribed, diffuse purulent, diffuse serous. A mere erosion of the lateral canal did not justify the diagnosis of circumscribed labyrinthitis, as the erosion might be quite superficial. Such an erosion should be left alone, reliance being placed on the drainage secured by some form of post-aural operation. Circumscribed labyrinthitis, though a real pathological entity, was almost undiagnosable clinically, the symptoms might mean the presence merely of serous œdema, the result of a septic focus in the vicinity. If there was more than an erosion—i.e., a fistula—what should the treatment be? The consensus of opinion was that it should be left alone. The differentiation clinically between the "open door" and the "protected territory" at present defied solution. The case was different in diffuse purulent labyrinthitis, with its profound loss of hearing, nystagmus, nausea, high temperature, &c.; this called for prompt and efficient surgery, as it was a dangerous condition owing to the likelihood of the infection reaching the base of the brain and setting up meningitis. Also, unless free drainage was carried out the function of the auditory nerve would be abolished.

In operating, Sir William Milligan's aim was to secure efficient drainage and yet conserve some functional activity. Wherever possible he left the cochlear segment alone as much as he could, freely

ablating the static segment, removing the pars promontoria, and leaving the columella alone. But if the hearing was destroyed in a case of severe infection, the freer the drainage the better. When a complete labyrinthectomy was required he preferred the "bridge" operation; the results in his hands were surprisingly good, the technical bugbear being the Fallopian aqueduct with its contained facial nerve. But with strong illumination and meticulous precision the nerve should escape injury. In 54 cases on which he had operated, any injury he might have done to the nerve had been permanent in none.

Non-suppurative Labyrinthitis.

The surgery of non-suppurative labyrinthitis constituted a more debatable and difficult problem. What, he asked, was the pathology of the pseudo-Ménière syndrome? Were these cases due to effusion into the internal ear, to atheromatous changes in the terminal blood-vessels of the part, or to a toxic neuritis? The cases were mostly met with among people who had mental strain and worry, and were characterised by attacks of severe vertigo, sickness, tinnitus, and progressive loss of hearing. Some had high, some low blood pressure, some had granular kidney, and others some digestive disturbance. But some otherwise healthy people were subject to sudden and violent attacks of vertigo, with sickness, tinnitus, and loss of hearing at irregular intervals. Sometimes depressants, such as bromides, gave relief, but the depression and incapacity required more heroic measures, and for years he had advised and carried out a partial or complete destruction of the labyrinth. He had performed it for this class of case 20 times without a fatality, with relief to the vertigo in all, but with disappearance of the tinnitus in only 40 per cent., though in half (20 per cent.) the noises were much relieved. The 40 per cent. of cases were probably central in origin. In opening up the canalicular system he saw no evidence of increased labyrinthine tension, and the structures appeared normal. He could say nothing on the pathology, as he had not seen a post-mortem specimen. He concluded that it was really a toxic neuritis, affecting at first the nerve proper, but later extending to the maculæ acousticæ, where it set up a vicious circle of static incoördination, oculo-motor, and gastric disturbance.

In conclusion, Sir William Milligan narrated some typical cases in which operation had been completely successful. Operation was only carried out after medical treatment had been persisted in for a period of from one to three years. He showed a number of slides illustrative of his thesis, some of which Mr. J. S. Fraser kindly sent him.

Discussion.

The PRESIDENT said Sir William Milligan was looked upon by his colleagues as a pioneer in labyrinthine surgery. Mr. C. E. West was inspired to operate on the labyrinth 20 years ago by Jensen's work in Berlin. The cases in which Mr. West and he did the operation were mostly those in which disease was being followed to its source in the course of a radical mastoid operation. Errors might have been made by operating on patients who, because they were seized with vertigo, were assumed to have disease within the labyrinth. Most would agree that in some cases the labyrinth was needlessly destroyed. But there was a class of case in which the infection of the middle ear was so virulent that the organism gained entry into the internal ear. In a man aged 60, with symptoms of otitis media, on whom the speaker operated, death occurred in 11 hours, and the patient had already got meningitis. In deciding whether to operate or not, a careful clinical examination was of the utmost importance.

Sir CHARLES BALLANCE said all would agree that there were certain cases which should not be operated upon, but that was so in the evolution of every fresh operation; and the operation had been done because the surgeon felt it to be his duty to carry it out. The operation described by Sir William Milligan should certainly be done in suppurative labyrinthitis. Failing the establishment of free drainage, the patient would certainly die. He (Sir Charles Ballance) thought the most important factor was to have a very free area of bone exposed behind the facial canal. He saw Jensen operate on labyrinth cases in Berlin in 1900 and 1901; he was an able operator, but so quick that onlookers felt trepidation as to possible unintentional injury. The speaker considered that this region should be operated upon with extreme care and deliberation; no disaster need then be feared. With regard to the other group of cases, the non-suppurative, he agreed that the condition seemed to be a toxic neuritis, and that there was, in the majority of the instances, no obvious change in the internal ear. In the cases narrated by Sir William Milligan the operation was not only justifiable, but urgent. In some patients the nerve could be divided behind the internal auditory foramen. It was easy to expose the cerebellum and press it back by means of dry, sterilised marine sponges, as used by Sir David Ferrier. In suppurative disease it was not always necessary to take away the capsule of the cochlea.

Dr. ALBERT A. GRAY (Glasgow) commented on the rarity of non-suppurative cases in children under 12 years of age. In Ménière's disease he thought the symptoms were due not so much to high or low inter-labyrinthine pressure as to a sudden change from one to the other; that was probably why it occurred in people who were overworked. He agreed that a number of cases might be toxic.

Dr. P. WATSON-WILLIAMS spoke of the necessity of excluding sinus disease.

Mr. MUSGRAVE WOODMAN agreed that simple conditions should be eliminated before operative treatment was entertained. He narrated a case in which a man said he was incapacitated by attacks of vertigo and tinnitus. He was found to have a tight block in his Eustachian tube. A fine bougie was tightly gripped at the isthmus. On repeating this a month later, the bougie passed fairly freely, and since then the attacks of giddiness had ceased. But there were some cases of non-suppurative labyrinthine trouble on which operation should be done. He related a case of the kind in which he performed free drainage, and the patient, a nurse, was able to resume her occupation.

Mr. E. D. DAVIS related a case in which a patient with violent nystagmus lasting 12 months had lumbar puncture performed and got well after it. She was very highly strung. A widow who was working very hard and experiencing much anxiety had violent vertigo, sickness, and nystagmus, with loss of confidence. The passage of an Eustachian bougie cured these symptoms. There seemed to have been bad results from division of the auditory nerve in the hands of several surgeons, due to severe hæmorrhage.

Mr. G. J. JENKINS agreed that many cases were diagnosed as disease of the labyrinth when there was only a middle-ear affection. Two children with very pronounced labyrinthine symptoms were cured by the removal of enlarged tonsils and adenoids. Owing to the lack of a specimen from a non-suppurative case, it was difficult to obtain a clear idea of the pathology of pseudo-Ménière's disease.

Mr. L. COLLEDGE said the chief question in a desperate case was as to what operation should be done. There was a likelihood that an increase of intracranial pressure might lead to symptoms. In some cases it was simpler and safer to do a cerebellar decompression operation than to open the labyrinth.

Dr. W. S. SYME said he always put the nasal condition of patients with these symptoms right before considering the question of operation. In only two non-suppurative cases had he opened the labyrinth. In acute cases he approached the question of operation warily.

Reply.

Sir WILLIAM MILLIGAN, in reply, said he also saw Jensen operate in Berlin, and he agreed with Sir Charles Ballance that he did his operations in this confined region far too rapidly. When the anæsthe-

tist pointed out to the operator that the facial nerve was twitching, the sharp reply was, "It does not matter." The facial nerve was paralysed before the patient left the table. He did not agree with Sir Charles Ballance that the cases were more easily approached through the posterior fossa. He had never found that lumbar puncture brought any permanent relief to the cases he had described. Years ago he tried decompression of the posterior fossa, but had now given it up. He emphasised the point that operation was not done by him until a very careful attempt had been made to exclude other conditions, and until medical treatment had been given a good trial.

A number of instructive cases shown by members were discussed.

Reviews and Notices of Books.

SYNOPSIS OF MIDWIFERY.

By A. C. MAGIAN, M.D., Gynæcologist to the Manchester French Hospital. London: William Heinemann (Medical Books), Ltd. 1923. Pp. 245. 8s. 6d.

THERE must be many practitioners so fully occupied that they have not leisure to read ponderous text-books on obstetrics, and yet are anxious to keep abreast with current thought and teaching. To such and to the senior student who wishes to refresh his memory before the examination ordeal, we can with confidence recommend Dr. Magian's little volume. As the title suggests, the book is a synopsis of the leading facts and principles of treatment, and in its compilation the author has freely consulted the writings of most British authorities on the subject. In the space of 245 small pages Dr. Magian has managed to compress a wonderful amount of material. The style, although somewhat didactic, is not abrupt, and each of the 31 chapters contains sound teaching.

We recognise many well-known precepts, and with most of the teaching we are in complete accord. There is very little debatable material, and such as is present must be attributed to the works consulted rather than the author. Progress moves apace, and for this reason it is difficult for any book which relies for its information upon its predecessors to be absolutely up to date. For example, there is no reference to Eardley Holland's recent work on the causes of stillbirth, or again in the chapter on anæsthesia to the advantage of spinal anæsthesia in Cæsarean section and in labour complicated by mitral disease. Eclampsia and its treatment, on the other hand, is well discussed, and the chapter on Forceps is particularly good. It contains what is necessary without any undue padding, and if the advice given is acted upon, the practitioner can be satisfied that he is acting up to ideals.

The book, like other synopses, is not intended to replace or add to the number of standard obstetric text-books, and is not suitable for the junior student. The senior man, however, will find it a very useful "refresher" and can be assured that the information he finds within its pages is sound.

PREVENTION OF DENTAL CARIES AND ORAL SEPSIS.

Third edition. By H. P. PICKERILL, C.B.E., M.D., Professor of Dentistry, and Dean of the Dental School, University of Otago. London: Baillière, Tindall and Cox. 1923. Pp. 340. 18s.

WHEN the first edition of this book appeared in 1911 it was generally recognised that Prof. Pickerill had made a notable addition to dental literature. It displayed original research and a determination to take nothing for granted. Instead of publishing various researches as they were completed in different journals, he withheld them until their appearance in this book. Thus the world of dentistry, not being in any way familiarised with the nature of his investigations, was the more prepared to be impressed by the amount and quality of original research embodied therein.

In form and matter this edition does not differ materially from the first, though both additions and emendations have been made. One feels that there is a certain risk in publishing successive editions of a book which is a record of personal research; the title-page may be dated 1923, but the work itself dates from 1911, and has lost some of its freshness. Prof. Pickerill's work has not passed unchallenged, but we do not find any serious consideration of investigations which have appeared since this book was first published. F. P. Chillingworth, for instance, has attacked both the chemical methods used by Pickerill in his investigation of salivary secretion, and his conclusions that it varies according to the food. This work appeared in 1922, and gives several references to earlier work directly dealing with Pickerill's results. The fact that the author does not take into account the work of Chillingworth and others rather lessens the value of his conclusions from the point of view that they still hold good without modification 13 years after their first publication. The section on the bacteriology of the mouth does not seem to go beyond the work of K. Goadby. In 1911 this was inevitable, but to-day we are in possession of the work done by P. Howe in 1917, and the still more important investigation of McIntosh, James, and Barlow in 1922, both of which make Pickerill's conclusions on this subject of less account. But many of the researches have been generally accepted and confirmed by other workers, that on enamel, for instance, has added another chapter to our knowledge of this complicated tissue. It would have been difficult perhaps to have added anything to this section of the book, so sound in plan and execution.

It is an encouraging sign that a book like this, which is not an ordinary text-book, but is crammed full of original work requiring close reading, should reach a third edition. Even if it has lost its first youth, it still remains a stimulating and suggestive piece of work. Its influence on dental thought, both in this country and abroad, has been considerable, and dental science is a debtor to Prof. Pickerill.

COLLOIDS.

Manuel de techniques de physico-chimie et spécialement de chimie des colloïdes; a l'usage des médecins et des biologistes. By LEONOR MICHAELIS. French translation by H. CHABANIER et C. LOBO-ONELL. Paris: Masson et Cie. 1923. Pp. 204. Fr.12.

WE have reviewed the second German edition of this work, of which this is an excellent translation into French. All that we said of the German original was to its credit, and applies equally well to the present translation, which will be welcomed by those who are less familiar with German than with French. A large sale for this volume can be predicted.

A MANUAL OF PSYCHOTHERAPY.

By HENRY YELLOWLEES, M.D., F.R.F.P.S. Glasg., M.R.C.P. Edin., Medical Superintendent, The Retreat, York. London: A. and C. Black. 1923. Pp. 247.

Dr. Yellowlees belongs to no particular school and gives an impartial account of current psycho-pathological theories. He accepts the psycho-analytical ætiology, but regards persuasion and suggestion, in which he includes the formal use of hypnotism, as of more immediate value than analysis. Hypnotism, however, he prefers to use as a means of aiding the return of lost memories, the process of integration thus carried out accomplishing more than the mere removal of symptoms by suggestion under hypnosis. The chapters on dream analysis and psycho-analysis briefly outline the subject, but are not intended as sufficient guides to their practice. Those on psycho-therapy in general practice point out the need for an

understanding of the unconscious processes described in previous chapters and contain sound advice on elementary and important points.

Concerning "nervousness" Dr. Yellowlees writes as follows: "With a little understanding and assistance, most patients who use this word will reveal themselves as cases of obsessional neurosis, or of some anxiety state, although it may be hard to put a diagnostic label upon such a case until after the patient's confidence has been fully gained in several interviews." The application of this teaching, simple as it appears, will reveal a wealth of clinical material that should tempt the practitioner into further study. As a guide to the objects of this study Dr. Yellowlees's admirable book affords a useful and practical introduction.

ZOOLOGY.

Outlines of Medical Zoology. By R. W. HEGNER, W. W. CORT, and F. M. ROOT. London and New York: Macmillan Company. 1923. Pp. 175.

THIS rather slender handbook of Medical Zoology has grown out of a publication which appeared in 1921, entitled "Diagnosis of Worms Parasitic in Man." It is naturally fuller than its progenitor and therefore to that extent more useful. But it is not a treatise upon the general zoology of parasites; it is a list of those known in man with sufficient diagnoses to aid public health officers, students, and physicians. For such readers it should prove a convenient epitome of much that it is necessary to determine in identifying a parasite. Identification is also rendered much more easy by a few plates illustrative of protozoan parasites, such as malaria, and of salient anatomical characters of eggs of worms and various parts of insects and mites. In connexion with their association with or merely as carriers of certain diseases the authors explain many of the methods in use for collection or preparation of protozoa, worms, and arthropods, which form the parasitic groups dealt with. All this information is undoubtedly strengthened by a reasonable list of books by different authorities, and a selection of journals which deal with parasitological matters. The usefulness of this handbook is enhanced by a fairly full index, in which references to pages on which a figure occurs are printed in heavy type, and names of investigators as well as animals are to be found.

A Manual of Elementary Zoology. Fourth edition. By L. A. BORRADAILE, Sc.D., Fellow and Tutor of Selwyn College, Cambridge. London: Henry Frowde and Hodder and Stoughton. 1923. Pp. 671. 18*s*.

Elementary Zoology for Medical Students. By L. A. BORRADAILE, Sc.D. Same publishers. 1923. Pp. 378. 10*s*. 6*d*.

THESE two volumes are hardly two separate works; for the smaller, which is intended only for the student of medicine, is practically an abbreviation of the larger volume from which the bulk of its pages are drawn. It has, however, a new introductory chapter. The Manual has now reached its fourth edition, having been originally published in 1912, and the author is to be congratulated upon its long life. The addition of two new chapters upon the sponges and echinoderms respectively may be noted, and a revision of statements and slight alterations in respect of mammalian embryology and the physical properties of protoplasm are to be found. A statement of this kind is made in the author's preface, and shows how fixed and almost axiomatic the general body of facts dealt with in an elementary text-book tends to become. The types of animals selected for detailed study are so well-known that it is almost difficult to fall into error. Furthermore, the continued and widely spread study of zoology throughout the world has brought before us a vast amount of facts relating to other animals than those commonly selected as types, and this has been confirmed again and again, and now constitutes a reliable collection of information. To such accumulations or conversant authorities any writer of a text-book to-day should apply for assistance or confirmation. Thus, the author, himself best known as a student of certain crustaceans, quotes the names of others who are well known in other regions of zoology.

AIDS TO PHYSIOLOGY.

Second edition. By JOHN TAIT, M.D., D.Sc., late Lecturer in Experimental Physiology, Edinburgh University; and R. A. KRAUSE, M.D., D.Sc., late Lecturer in Hygiene and Physiology, College of Hygiene and Physical Education, Dunfermline. London: Baillière, Tindall and Cox. 1924. Pp. 255. 3*s*. 6*d*.

IT must not for a moment be supposed that the authors intend this small work to be used by students as a text-book of physiology; it is not a text-book, and can never be regarded as one. Whether such small and compressed books are of any real value is a thing best decided by students themselves. Judging from their sale, it would seem that they have a certain field of usefulness, and in so far as small books of this description are used by students for purposes of revision only, there is nothing to be said against them. This present volume is excellent in its way, is accurate and up to date, and puts the subjects in the smallest possible space. We should only object to it, and then most violently, if students were to attempt to learn all their physiology from it, for such efforts would be attended with certain failure. This little volume, like its similars, should prove valuable in those trying weeks which immediately precede an examination.

JOURNALS.

QUARTERLY JOURNAL OF MEDICINE.—The January number contains the following articles: Acute Myelocythæmia and Chloroma, by Alexander Goodall and W. A. Alexander. Four cases of acute myelocythæmia are recorded, the first being a typical example of the disease and the last of chloroma, whereas the third shows features which are intermediate between the two conditions. Less than 100 cases of chloroma have been published to date, and the third of the series here recorded, representing the intermediary stage, is regarded as unique. The disease had a rapid course in every instance, varying from two weeks to three and a half months. The total white cell count was relatively low, and the spleen was not greatly enlarged. The opinion is expressed that leukæmia is the result of infection, and that the process is of the nature of a tumour growth. The article is illustrated by two plates, showing the macroscopical and microscopical appearances.—An Investigation into the Pathogenesis of Disseminated Sclerosis, by D. K. Adams, J. W. S. Blacklock, E. M. Dunlop, and W. H. Scott. A clinical description of the early symptoms is first given. Examination of the cerebro-spinal fluid shows that whereas the Wassermann reaction is negative in disseminated sclerosis the colloidal gold test gives a positive reaction. It has been disputed whether it is possible to produce nervous disease in rabbits by the injection of the cerebro-spinal fluid obtained from patients suffering from disseminated sclerosis. The authors inoculated 16 rabbits with cerebro-spinal fluid obtained from nine patients, and produced nervous symptoms in five of the rabbits, with fluid from five of the nine patients. Injection of citrated blood from eight patients produced nervous symptoms in three instances. Emulsions of the central nervous systems of rabbits showing nervous symptoms produced, on inoculation into other rabbits, nervous symptoms in two of the 11 tested. In all over one-third of the rabbits inoculated developed nervous symptoms, whereas control rabbits inoculated with blood and cerebro-spinal fluid from normal individuals and those

suffering from other diseases showed no effect. Spirochætes were found in some of the inoculated animals. Early diagnosis and treatment with the salvarsan group of drugs is recommended. Two plates are included, illustrating the nervous symptoms produced in the rabbits, and the microscopical appearances of the organs of the infected animals.—Diastase Determination in Urine and Blood as a Method for the Measurement of the Functional Capacity of the Kidney, by D. D. Stafford and T. Addis. The authors first describe their methods for estimating the amount of diastase in the blood and urine. An investigation was carried out on a series of cases of Bright's disease. It was found that the concentration of diastase in the plasma and the urine, and the rate of diastase excretion did not afford any indication of the extent of the renal lesion, as judged by the rate of urea excretion and the urea concentration in the blood.—The Adenoid Child: A Histological and Clinical Study, by Lucy Wills and Joan Warwick. As the result of a clinical and histological study of adenoid children, the authors conclude that a relationship exists between the type of adenoid enlargement and the configuration of the child. In inflammatory adenoid lesions the figure and bodily posture is normal, whereas in adenoid hypertrophy there is muscular hypotonus with marked lordosis and a pendulous abdomen. Chest deformities are found in both groups, they are probably due to rickets. A correct diagnosis of the histological character of the adenoid enlargement was made on postural grounds in between 83 and 88 per cent. of cases. Plates illustrating the configuration of the children and the histological appearances of the adenoids are included.—Arthropathia Psoriatica, by Archibald Garrod and Geoffrey Evans. The association of joint lesions with psoriasis has been described by many authors. Three cases are here recorded, in two of which a peculiar condition of intermittent hydrarthrosis occurred. Menstrual irregularity was also a prominent feature.—The Operation of Cardiolysis, with a Description of Two Fresh Cases and an Analysis of the Literature, by Geoffrey Bourne. This article opens with an account of the physical signs and mechanics of adherent pericardium. The indications for cardiolysis are then described, the chief of which is heart failure with pericardial adhesions, the contraindication being a severe progressive rheumatic lesion. Two cases operated upon by Mr. Joseph Adams are described, in both of which there ensued a considerable degree of amelioration of symptoms. The article concludes with an abstract of 23 cases from the literature.—Experiments on the Ætiology of Chronic Infection of the Spleen, by Alexander George Gibson. In a previous communication to the *Quarterly Journal* (1914, vii., 153) the author detailed some observations on cases of splenomegaly of obscure origin, in which it was suggested that infection with a streptothrix might be the ætiological factor. Further experiments have now been performed with a streptothrix isolated from the spleen of a patient who had suffered from recurrent acholuric jaundice. Ten monkeys were inoculated, and all showed symptoms of disease. From three of the animals the streptothrix was recovered and grown in pure culture. It is therefore claimed that Koch's postulates have been complied with, although it does not appear clear that the inoculated monkeys suffered from the same disease, as the patient from whose spleen the streptothrix was isolated, for in only one monkey was the spleen enlarged, and in none was the fragility of the red cells increased.—Critical Review: Sepsis as a Cause of Lymphocytosis, by H. Letheby Tidy. Sixteen cases of lymphocytosis possibly associated with sepsis have been collected from the literature published from 1907 onwards. An analysis of these is given, as a result of which the author concludes that there is no evidence that sepsis produces lymphocytosis.—The journal concludes with an account of the proceedings of the annual general meeting of the Association of Physicians of Great Britain and Ireland held at Edinburgh in 1923.

JOURNAL OF INDUSTRIAL HYGIENE. November, 1923.—The effect upon output of alternating occupations is discussed by J. M. Baumberger. He presents a study of output hour by hour in the processes of glass gathering, the spin-top lathe operation, and recessing gears. In the first, work is only carried on for a short time and then is alternated for another process, in the last two the operation is continuous through the shift. The author finds that a closer approach to maximum working capacity occurs when occupation is alternated, and suggests that in this way increased output might be obtained in many industries.—C. K. Drinker contributes an article on the present status of resuscitation in cases of electric shock and of carbon monoxide poisoning. He finally concludes that the Schäfer method of resuscitation is at once the simplest and most effective method, and decides against any specially constructed apparatus, except in unusual circumstances. For this reason he does not favour the oxygen-carbon-dioxide method.—E. L. Collis writes a statistical article dealing with the general and occupational prevalence of bronchitis, in which he discusses its relation to phthisis and to pneumonia. He finds that the mortality from bronchitis has been falling even more rapidly than that from phthisis, while in contra-distinction the mortality of pneumonia has been rising. Climatic conditions and atmospheric pollution are considered to be the main causative influences affecting bronchitis, while no evidence is found that it spreads as does phthisis through infection. Bronchitis is held to be a disease of chronic traumatic origin associated with irritating atmospheric conditions.——The number dated December, 1923, contains an address by C. E. Ford, President of the American Association of Physicians and Surgeons, which contains matter of some interest. He points to the strategic position occupied by the industrial physician with regard to many public health problems, and places within his purview such things as infant welfare and pre-natal care as being subjects inextricably bound to the industrial future of the nation. He holds that merely by applying present knowledge the average length of life could be readily extended to 65 years, and shows how low wages result in high rates through increased sickness. The author gives definite statistics to support his case.—J. N. Basin deals with the prevalence of medico-legal aspects of sprained back, a common condition seldom treated scientifically. The author holds that in each case there is a solution of tissue continuity by tearing soft tissues, joint luxation, and occasional sprain fracture in the lower spinal region. He strongly advocates a pelvic girdle support to prevent "labour back" for all manual workers. Accurate diagnosis and early treatment are held to be necessary to economic recovery.—L. R. Thompson and D. R. Brundage discuss the way in which sick benefit associations may profitably engage in the work of preventing disease. These associations possess information as to the extent and locality of sickness, which may vary from 151 cases per 1000 in one industrial plant to 62 cases in another. Only by following up such statistical information can the cause of undue sickness be accurately diagnosed. The authors put forward an unanswerable case for the need for morbidity statistics.

LEAGUE OF NATIONS HEALTH ORGANISATION.—We have received four pamphlets, prepared for the Society of Medical Officers of Health in connexion with the visits of foreign public health officers arranged by the Health Organisation of the League as part of a scheme for interchange of public health personnel, financed by the Rockefeller Foundation. The first pamphlet contains Notes on Public Health Organisation in England, by Dr. Charles Porter. The other three, by senior officers of the Ministry of Health, are entitled "English Port Sanitary Administration," by Dr. R. J. Reece; "Administrative Control of the Purity of Food in England," by Dr. A. W. J. MacFadden; and "Anti-Tuberculosis Measures in England," by Dr. F. J. H. Coutts. These pamphlets illustrate medical intelligence and propaganda which is very appropriate to a Government office, and represent the sort of handy up-to-date information which the Ministry of Health itself might usefully publish for home consumption.

The Conduct of Medical Practice.

A Series of Articles by Experts dealing with the Difficulties Encountered in Professional Life and How to Meet Them.

VI.—ACTIONS FOR DAMAGES: ERRORS OF DIAGNOSIS.

By HUGH WOODS, M.D., D.P.H.,
GENERAL SECRETARY, LONDON AND COUNTIES MEDICAL PROTECTION SOCIETY.

Beware
Of entrance to a quarrel; but ....
—*Hamlet*, Act I. Sc. 3.

ACTIONS for damages are rarely brought against medical practitioners in respect of alleged deliberate wrongdoing. Damages are claimed in the great majority of cases on the ground of negligence, or want of skill, or both. Want of skill is not often put forward as the main ground for claiming damages. To substantiate such a claim it must be proved that the skill exhibited was below that which any ordinary individual of the practitioner's standing in his profession would be reasonably expected to possess. A jury is not readily inclined to believe that a properly qualified doctor has not the average skill that all doctors are assumed to possess. If he has caused damage to his patient they are much more ready to believe that, while he had skill enough to avoid it, he did not take the trouble requisite for this purpose. The defence against a claim for damages consequently depends almost always on the evidence available in disproof of charges of negligence on the part of the doctor. Treatment, whether medical or surgical, is often unsuccessful. Patients die, or get worse instead of better, and the medical attendant may be blamed. In fact, with some people, it seems to afford them relief if they throw the blame for their misfortunes on someone else, and recent legislation, such as the Workmen's Compensation Act, appears to have created an impression that misfortunes or accidents should be alleviated by compensation at the expense of someone other than the sufferer under almost any circumstances.

Precautions Against Accusation of Negligence.

To obtain compensation from the medical attendant charges of negligence are readily trumped up, and they are often difficult to rebut. It is easy enough after the event to find fault with what has been done, and to contend that things which were left undone would have had far better results. Almost any line of treatment is open to criticism, and medical evidence is too often available in support of criticism more or less captious or unfair. Hence it becomes a matter of ordinary prudence for doctors to adopt precautions against accusations of negligence in their treatment of patients. Preventive precautions are, of course, best, but these will frequently fail, and it is therefore necessary to be prepared to defend oneself successfully when attacked. It is a mistake to suppose that the most careful practitioner will be immune to attacks founded on allegations of negligence. Claims for alleged negligence, put forward without any just foundation by dishonest or foolish claimants, may nevertheless be very difficult to meet satisfactorily. Conscientious care in all cases is a matter of duty as well as of prudence; but it is also advisable to avoid all appearance of carelessness and to remember that the adoption of routine precautions, the making of detailed examination, the employment of tests, and in general the outward indications of care, assume an importance quite beyond their due when a case goes into court. Especially important is the evidence of little details of the procedure adopted in arriving at a diagnosis when an error has been made, as will happen with the best of physicians or surgeons. A stupid mistake made in diagnosis after a punctilious observance of all the appropriate rules for arriving at an accurate diagnosis is much less likely to lead to legal disaster than the making of a mistake which could hardly or at all have been avoided, if any procedure recognised as advisable has been omitted, even though the practitioner has quite reasonably considered it unnecessary or useless.

X Ray and Bacteriological Examinations.

Consequently, in the case of injury of bones or joints, it will be a great advantage to the surgeon if an X ray examination has been made; and if such examination has been omitted and the exact nature of a fracture or dislocation has not been detected the omission will be described by plaintiff's counsel as gross neglect, and to it he will attribute any failure to attain a perfect result, even though it be a case in which permanent deformity was highly probable. Again, if a medical attendant has failed to detect a disease such as tuberculosis or diphtheria, it will be unhesitatingly assumed by plaintiff's counsel, and quite likely believed by the jury, that a bacteriological examination would have ensured an accurate diagnosis. It will be difficult, on the other hand, to prove that such an examination would not have been desirable or conclusive. A verdict of negligence, and an award of damages, is only too likely to result even though there be no reasonable grounds for the belief that a more precisely accurate knowledge of the conditions would have meant better treatment or a more satisfactory result.

Sharing the Responsibility.

It may seem, then, that it should be an absolute rule that such examinations should without exception be insisted on in the interests of the medical attendant quite apart from those of the patients. There are, however, in many cases serious difficulties in the way of adopting this as a fixed rule. Patients and their relatives often object to the cost, and ask if the doctor thinks such examination really necessary. Unfortunately, the fact that the doctor feels quite sure of his diagnosis, without special methods of examination, does not preclude the possibility of error, and the fact that any examination at all likely to be made will not alter the treatment does not make the doctor's position safe if an error is subsequently detected. In remote country places the difficulty in the way of an X ray examination is sometimes very serious, and it may be impossible to arrange for it without prohibitive expense or the risk of ill consequences from the conveyance of the patient to a place where such examination is practicable. In these instances the responsibility should be laid as far as possible on the patient or the responsible relatives. The desirability of the examination should be clearly explained and any danger or expense that will be involved should also be pointed out. This should be done either in writing or in the presence of trustworthy witnesses, so that in the event of a claim for damages it can be incontestably proved that the patient was fully informed and accepted responsibility. Otherwise, the medical attendant may find his truthful assertions positively denied, and it may be supposed that he is only inventing excuses to justify his own negligence.

In some cases, when the doctor is convinced that unnecessary risk of a bad result will be run if the examination he recommends is not carried out, it may be advisable to refuse to continue in charge if his advice is not followed, but, of course, if the extreme step of withdrawing from a case is decided upon, proper care should be taken that the patient shall not be exposed to any risks thereby.

ARUNDEL AND DISTRICT COTTAGE HOSPITAL.—A satisfactory financial situation was reported at the annual meeting of the governors on Jan. 31st. The receipts for 1923 totalled £1422, including £613 from subscriptions £292 from hospital fees, and £300 from the pageant committee. The latter had been invested, and the balance at the bank increased from £210 to £283. The net expenditure was £1033, and the net revenue, £1121 18*s.* 8*d.* It will be remembered that in 1917 the town took over the hospital from the Duchess of Norfolk, and the executive committee assumed financial control, with Sir William Bird as President.

THE LANCET.

LONDON: SATURDAY, FEBRUARY 9, 1924.

HOUSING AND HEALTH.

THE first Minister of Health, Dr. ADDISON, was a medical man, and it was, we believe, with the approval of the Administration with which he was associated that he embarked upon a campaign for setting right our lamentable housing conditions, making it the reason and basis of his official life, and considering that such action was fundamental to the duties of his office. The fact is well-known, though its reasons are not correspondingly clear, that the great activities thus set in motion had to be suspended; Dr. ADDISON failed to obtain the support of his colleagues for his objectives, and thereafter housing questions have not taken so prominent a position in the programmes of succeeding Ministers of Health. Yet all medical men know that whoever presided over the Ministry must have been aware of the vital importance to the health of the nation which is implied in housing reform.

The new Minister of Health, Mr. JOHN WHEATLEY, has done well, therefore, in selecting the housing question as the subject for his first speech to his constituency upon his appointment, when he took the bold course of confessing that he was not in a position to say what the Government's policy is or would be. We say bold, for it is possible to be discreet and valorous simultaneously, and to require more courage to confess to the discretion than the valour. For medical men Mr. WHEATLEY'S acknowledgment that he was taking thought of the undoubted difficulties in his path before deciding how to meet them, implies a promise that he will face those difficulties by ascertaining their sources and estimating their importance. We hope that such is his intention, for then he may arrive at a course of therapeutics founded upon the origins of the evils rather than upon their symptomatology. He will, it seems to us, lay truly the foundations of an enormous task, if he can clear away from the public mind the many misunderstandings which impede all in whose hands the actual provision of adequate housing must lie, among whom the whole of the medical profession, and not only the branch of that profession officially attached to his bureau, must be included. Medical men, finding in bad housing conditions the origin or the fomenter of disease, feel helpless in their attempts towards remedy as long as it is idle for them to make representations for housing reform; and yet it is no reproach upon any public authority to confess itself unable to carry out such recommendations as are made. And these conditions will remain so long as political animus leads one school of thinkers to attribute the present inertia entirely to the intention of a certain class to exploit the interests of the nation for private profit, or another school of thinkers to see an alleged insistence by trade-unions upon monopolies as the sole source of the evil. The health of the people is not a political question but a national one, and, where the right course to be taken cuts across the political views of the Government or of any opposing party, the party views should not be maintained, and no party capital should be made out of the acquiescence of any section of Parliament to a conjoint scheme containing certain elements of which, as a party, they must disapprove.

While the policy of the new Minister of Health is to commit himself for the present to no particular policy, the inertia of the past is not to continue. For we understand that there is a programme to provide for 120,000 houses in the first year, the work to develop in proportion as labour and material are obtained; the former will have to be guaranteed as continuous, and the latter subjected to equitable rates of purchase. It will be as natural for a Minister of Health to turn to the medical profession of the country for assistance as it is natural for us to point out the prudence of the course. It should be and would be possible to obtain an expression of sound medical opinion upon the meaning of overcrowding, and upon the circumstances which would affect any statistics of population in this regard. Similarly medical opinion, if collected from widely separated sources and properly tabulated, would be of the highest practical use not so much in advising upon new construction as in suggesting how to transform wisely the large number of existing buildings where their condemnation would be wasteful while their application to their old purposes is lost. Another advantage of medical coöperation would be the revivifying of the powers possessed by sanitary authorities of inspecting premises with a view to their fitness for habitation: these powers are possessed but under war conditions they fell into abeyance. If buildings were transformed in consonance with medical ideas it would be an obvious responsibility upon the medical profession to see that the work was not only well done but continued to provide decent and suitable accommodation. We are not suggesting that the Minister should begin the campaign by summoning medicine to his assistance, but sooner or later he must ask medicine to stand by him in his task, and we trust it is not merely prejudice which makes us think that the sooner the invitation were given the better. In the medical profession the Minister of Health has a body of highly trained men distributed, even though unevenly, throughout the country, a large majority of whose members are personally acquainted with the results of foul or scanty housing in various environments, and a distinguished fraction of this profession are officials in his own department while members of the great medical constituency. When schemes are set in hand, as the labour and material are found, medical men should be made familiar with those schemes, when various experiences at different centres would almost automatically become common property through the medium of the medical officers of health.

SURGERY OF THE SPLEEN.

A RECENT discussion at the Royal Academy of Medicine in Ireland raised the questions when and how the spleen should be removed. Operative methods in the treatment of splenic diseases do not bulk largely in the practice of the average surgeon. There are several reasons for this. The physiology of the spleen is but imperfectly known, though it would appear to be important judged by the very profuse blood-flow through it, which is assisted by rhythmical contraction of the organ itself. This ignorance of true function has prevented the development of

surgical measures devised to influence its normal activities. It is to be noted that such surgical operations would not necessarily be performed upon the spleen itself, though should they be, the possible field of intervention is very strictly limited by anatomical conditions. Surgical therapy of the spleen resolves itself almost exclusively into removal of the organ. There are a few exceptions: occasionally a suppurating cyst or abscess requires a simple incision, whilst now and then it has seemed advantageous to perform splenopexy when the viscus has become abnormally mobile. Even here, however, in the general consensus of surgical opinion removal is preferable to fixation. A discussion of the surgery of the spleen, then, concerns itself chiefly with the consideration of the advisability of excision in certain conditions of injury and disease. Splenectomy has been performed more often for traumatic rupture than for any other affection, rupture being the commonest cause of severe intra-abdominal hæmorrhage after injury. There may be, as an associated thoracic lesion, a fractured rib, itself the actual lacerating agent, or the rib may have torn the lung and so confuse the clinical picture. It is important to remember that the intra-abdominal hæmorrhage is sometimes delayed. An interval of as long as nine days has been recorded between the time of the injury and the onset of clinical signs of internal hæmorrhage. In such cases it is supposed that either a laceration has been plugged with clot or the primary hæmorrhage has been subcapsular. A cough or other sudden movement of the patient dislodges the clot or ruptures the thin, distended splenic capsule when the catastrophe occurs. After removal of the spleen, it has been suggested recently that the blood effused into the peritoneal cavity should be returned to the circulation of the patient. Spontaneous rupture occurs in malaria and during the course of some infective diseases, as typhoid and even puerperal fever. Surgical treatment is then urgently needed, but fraught with great risk.

There are a number of diseases in which splenomegaly occurs and in which splenectomy has been tried, but until recent years with only very indifferent success. Particularly as a result of careful work in the Mayo Clinic, the indications for splenectomy in these diseases have been formulated on a statistical basis, the only possible basis in the pathological obscurity which at present enshrouds them. In that vaguely defined disease, splenic anæmia, some have claimed that removal of the spleen has brought about complete cure. Whether this can be substantiated is open to doubt, but certainly after splenectomy improvement nearly always takes place, and the measure should be recommended in view of the hopeless outlook with medical treatment alone. At the Mayo Clinic the operative mortality in 71 cases was 12·6 per cent. In pernicious anæmia the ultimate results are not so good, but the mortality was brought down to less than 6 per cent. (in 54 cases) and the patients live, on an average, two and a half times as long as non-splenectomised patients. In this disease the removal of suspected foci of infection is essential, and in all these cases blood transfusions are almost indispensable if we are to obtain the above happy outcome in a high percentage of operations. In the different forms of leukæmia splenectomy has always been regarded as exceedingly fatal. Adhesions are usually present and abundant; their separation leads to hæmorrhage, which is not easily controlled. At the Mayo Clinic this difficulty has been overcome by a preliminary treatment with radium, by which the spleen is made to diminish in size temporarily. In this way 29 splenectomies were performed for myeloid leukæmia, with only one death; the lives of these patients were certainly prolonged by the operation. In hæmolytic icterus of the acquired type complete cure results from splenectomy, and the operation should be advised; it should never be done in the familial type, as such patients may live to an advanced age and suffer no inconvenience from the condition. Finally, in Gaucher's disease splenectomy has not been found to be very effective.

To sum up, it will be seen that a degree of alleviation, in some cases quite great, can be brought about in certain grave diseases associated with enlargement of the spleen by its removal. The operation, however, is always hazardous, and should not be undertaken except in favourable surroundings and after careful preparation of the patient, by blood transfusion as a rule, by the therapeutic application of radium sometimes.

THE FAT-STANDARD OF COWS' MILK.

EVER since the passing of the Sale of Food and Drugs Act of 1875, there has been discussion as to what composition should entitle cows' milk to be regarded as genuine. Twenty-five years ago a presumptive standard was set up, to the effect that, unless the milk contains 3 per cent. of fat and 8·5 per cent. of non-fatty solids it is not genuine, fat having been abstracted or water added—unless the contrary is proved. Reports on samples taken all over the country under the above-mentioned Act show that the average fat-content of all samples, including those obviously adulterated, exceeds 3·5 per cent., and is usually about 3·6 per cent. The standard of 3 per cent. is therefore a low one, and for this reason the Regulations of 1923 prescribed that the equivalent of fat in condensed or dried milk must be calculated on a 3·6 per cent. basis. For the moment, therefore, there is a legal standard of 3·6 per cent. of fat for condensed and dried milk, and a presumptive standard of 3 per cent. for ordinary milk. The Scottish Inter-Departmental Committee has recently expressed its dissatisfaction with this presumptive standard, and has recommended the substitution of a legal standard of 3 per cent. fat and 8·5 per cent. of non-fatty solids, evidently in hope of raising this standard later. The presumptive standard has certainly not worked well. Many conflicting decisions have been given. It has been held on the one hand that any fluid which comes from a cow's udder is milk, and on the other that a farmer may so treat his cows, by poor feeding and unequal inter-milking intervals, that the fluid coming from the udder may be regarded as not being milk. In some parts of the country, especially where the inter-milking intervals are very unequal, it has always been possible to procure expert evidence that the morning milk of a single cow frequently, and the morning milk of a herd occasionally, contains less than 3 per cent. of fat. Prosecutions are not undertaken when the fat is only 5 or 10 per cent. below the standard, and frequently fail when the deficiency is much greater. The presumptive standard of 3 per cent. is virtually only one of 2·7 per cent. The quality of milk as now supplied depends chiefly upon the honesty of the vendor and the complacency or otherwise of the buyer; during the period since 1875 we have got back to the principle of *caveat emptor*.

Among agriculturists it is recognised that, provided a cow enjoys a good ration, the fat-content of its milk is little affected by changes in its dietary. The late Mr. JOHN SPEIR, a member of the second Royal

Commission on Tuberculosis, produced much evidence in support of this view. Morning milk contains appreciably less fat than afternoon milk, and doubt may arise as to whether this difference is accounted for entirely by the difference in the inter-milking intervals. The publication by Mr. WILFRID BUCKLEY in pamphlet form of the result of experiments carried out at his Basingstoke farm, comes opportunely. The pamphlet is entitled "Some Observations on the Butter-Fat in Cows' Milk," and describes two investigations carried out in 1915 and 1922 respectively.

The first investigation dealt with the morning and evening milk of 65 shorthorn cows for 39 days (from April 18th to May 26th, 1915). From April 18th to May 5th the cows were stall-fed on a ration controlled by Mr. JAMES MACKINTOSH, a well-known authority on the feeding of dairy cattle. After May 5th the cows were turned out to grass, and had no other food. The analyses were made on behalf of the medical officer of health of Hampshire by Mr. SLIM, who resided at the Basingstoke farm during the investigation. At first all the cows were milked after intervals of 15 and 9 hours respectively, but later the intervals of two sections were changed to 13 and 11 hours and 17 and 7 hours respectively, while the third section kept to the intervals of 15 and 9. On nine mornings out of the 39 the mixed milk of the 65 cows fell below 3 per cent. of fat, the lowest record being 2·7 per cent. On the other hand, on only nine evenings did the mixed milk of the 65 fall below 3·9. On May 4th the morning mixed milk of the herd gave 3·17 per cent. of fat, and the evening milk 4·14 per cent. During this day 17 out of 63 cows gave milk containing below 3 per cent. at the morning milking, while 2 out of the 63 gave milk containing under 3 per cent. of fat at the evening milking. The morning and evening milk of a single cow (No. 195) for the whole period is given as an extreme example of variability. The morning milk of this cow varied in fat from 1·7 per cent. to 5·9 per cent., while her evening milk varied from 2·5 per cent. to 7 per cent. On the evening of May 1st this cow gave 9 pints of milk containing 6·3 per cent. of fat, on the following evening 9 pints containing 3·2 per cent. of fat, and on the morning between 11 pints containing 1·8 per cent. of fat. This cow appeared to be in excellent health throughout. The figures given show that, as a rule, the percentage of butter fat increases with the progress of lactation. The change from stall-feeding to grass was accompanied by a reduction in the percentage of fat for the whole herd from 3·71 to 3·61.

The second investigation was conducted by Mr. J. R. FRASER, of the Government Laboratory, on behalf of a committee of the Medical Research Council, several of whose members were present throughout.

The second investigation lasted five days, from April 24th to April 28th, 1922, and confirmed the results of the first with respect to the daily variation in the fat percentage of the milk. One cow in this investigation gave about 6 gallons of milk daily, and an average of 2 per cent. of fat in the morning and 4 per cent. in the evening. Her subsequent record was kept, and although for the next few months she seldom gave 3 per cent. of fat in the morning, her annual yields of fat and non-fatty solids were 2·14 and 2·25 times those of the average milch cow in Great Britain.

The experiments with regard to altering the inter-milking intervals gave somewhat discrepant results. We venture to suggest, however, that for several months the cows experimented on had been milked at intervals of 15 and 9 hours, and that udders probably acquire habits, and can hardly be expected to make a machine-like response to a change of this kind.

We have discussed Mr. BUCKLEY'S investigations at some length, because we hope they may lead up to others. We can hardly have one legal standard for morning and another for evening milk, even should equal inter-milking intervals prove impossible to achieve. Nor do we want a legal standard of 3 per cent. of fat, when we know that the average of the milk supplied to the public at present contains nearer 3·6 per cent. For condensed and dried milk we have already adopted the standard of 3·6 per cent. Both these concentrated milks are produced in this country, and we are up against the anomaly that the morning milk of dairy-herds cannot be used alone for the making of condensed or desiccated milk without infringing the law. The problem is a difficult one, and there is no case for hurried legislation.

ANTI-LEPROSY MEASURES.

THE object of the British Empire Leprosy Relief Association is to stamp out leprosy in the British Empire, and the Viceroy of India, in his message to the Mansion House meeting last week, was no doubt perfectly justified in saying that the time is auspicious for an earnest campaign to combat this terrible scourge. Time was when nothing but the certainty of a specific cure would have obtained from a benevolent public the means to carry out effectively such a campaign. Fortunately the Association is not lending itself to propaganda which cannot be fully substantiated, and a larger public is likely to enter with zest into the game of attacking a disease in which resource and ingenuity are essential and in which finesse is not out of place. Leprosy when acquired is not the inevitable and incurable horror which it is held to be; it is a self-healing disease, in typical cases of which immunity is gradually produced. We are happy to set out and emphasise this statement of Dr. ERNEST MUIR, research worker in leprosy under the Indian Research Fund Association and successor to Sir LEONARD ROGERS in his work at the Calcutta School of Tropical Medicine and Hygiene. From new knowledge of the natural history of the disease will follow logically the methods by which its recovery can be helped or accelerated. During the first two stages the chief object of treatment is to restore the lowered tissue resistance and prevent the disease from passing on into the third stage. When, in spite of these attempts, the third stage has been reached, the aim of treatment is then to bring about moderate reactions so as to hasten the resolution of the lesions before deformity and disablement occur. Finally, in cases which have passed through the third stage, cure may be hoped for in so far as active disease is concerned. These are the immunological principles upon which the campaign will be based, and as Prof. ROGERS was at pains to set out, the Association will make a threefold effort (1) to bring known improvements in treatment within the reach of existing lepers, (2) to support existing efforts at segregation so far as the schemes are sound, and (3) to inaugurate research into the spread of the disease and further possible improvement in the methods of local treatment. For it is surely unjustifiable, as indeed the International Leprosy Congress agreed last year, to segregate lepers for the benefit of others without supplying the best possible treatment for the victims. This is a reasonable campaign to which the best powers and abilities of many varieties of workers can be unhesitatingly given. It is worthy of support by a thinking public.

INDEX TO "THE LANCET," VOL. II., 1923.

THE Index and Title-page to Vol. II., 1923, which was completed with the issue of Dec. 29th, is now ready. A copy will be sent gratis to subscribers on receipt of a post-card addressed to the Manager of THE LANCET, 1, Bedford-street, Strand, W.C. 2. Subscribers wishing to receive the Indexes regularly as published should indicate this desire.

Annotations.

"Ne quid nimis."

EASTER MEDICAL TOURS IN FRANCE.

THE eighteenth Voyage d'Études Médicales will take place at the Easter season of this year. These tours are organised by a central bureau in Paris, and are under the scientific direction of Dr. Paul Carnot, professor of therapeutics in the University of Paris, assisted by his professeur agrégé, Dr. Rathéry. For 14 years before the war the V.E.M., as the organisation is known to French medical men, conducted tours designed to make better known to French and foreign doctors the various spas of France. After an interruption of six years the tours were resumed in 1921, and have grown increasingly popular in this country. Each year a different district is chosen for study; in 1922 a visit was paid to the sulphur springs of the Western Pyrenees, of which a full and illustrated account appeared in THE LANCET.[1] In the autumn of 1923 a delightful journey was taken through Savoy, the Dauphiné, and the Jura, where the claims of several well-known spas were studied. This year the projected tour embraces the spas of the Mediterranean, and in consequence the usual date has been altered, for late summer does not offer the ideal climatic conditions from the therapeutic point of view. Easter has therefore been selected as the most advantageous season, but as the holiday time at the disposal of doctors at this period of the year is generally limited, the eighteenth V.E.M. will consist of three independent tours. The principal tour will include the resorts in Provence and on the Côte d'Azur, and will extend from April 17th to 23rd. The starting-point is Aix-en-Provence, and members will disband at Nice. The number of participants is limited to 180 and the cost of the tour is 450 francs.

A preliminary tour of the resorts of Cerdagne and the Pyrénées orientales is under consideration. Members are due to arrive at Carcassonne individually on April 13th, and after visiting the town will leave on the following day by motor cars for the Valley of the Aude, Usson-les-Bains, Mont-Louis, Font Romeu, les Escaldes, Thués-les-Bains, Vernet-les-Bains, Le Boulou, Amélie-les-Bains, Banyuls, and Montpellier; joining the principal tour at Aix-en-Provence on the morning of the 17th. The maximum number of participants is 60, and the approximate cost 350 francs. Lastly, a tour is contemplated in Corsica for the period from April 23rd to 27th, crossing from Nice to Bastia, and proceeding to Orezza, Corté, Vizzavona, Piana, and Ajaccio. The return journey to Nice, or, if possible, Marseilles, will probably be made on the evening of the 27th. This tour is also confined to the maximum number of 60 members and will cost 400 francs. As in former years, a reduction of 50 per cent. will be granted by the French railways to doctors and medical students (from place of residence or from the frontier station to the place of concentration and vice versa). It must be noted, however, that the committee of the principal railways have decided to cease the extension of this facility to the wives or daughters of doctors.

Any members of the medical profession desirous of participating in the eighteenth V.E.M. are asked to communicate as soon as possible with Madame M. C. Juppé-Blaise, representative of the French Spas, at the Office Français du Tourisme, 56, Haymarket, S.W. 1. They are requested to state whether, in addition to the principal tour of the Côte d'Azur, they wish to take part also in the tour of either Cerdagne or Corsica, or both. Participants who wish to be accompanied by their wives or daughters, should circumstances permit of suitable arrangements being made, are asked to state whether they would be prepared to go alone in case such arrangements could not be carried out.

[1] THE LANCET, 1922, ii., 824, 880.

MUSCULAR ABNORMALITIES.

IN a paper on this subject in our present issue Prof. Gordon Harrower mentions four or five interesting abnormalities which have come under his notice in the dissecting room at Singapore. Two of these muscular anomalies, at least, have the added interest that they might conceivably possess a clinical bearing. The rectus sternalis is a well-known variant. Prof. Harrower figures a very well-developed bilateral specimen. It must be recognised, however, that the muscle is usually unilateral, but when it is double it may have different shapes and directions of its fibres, and during life, if contracting, may produce very curious effects, quite inexplicable to those that are ignorant of the structure. The careful studies of nerve supply mentioned by Prof. Harrower are of great interest to the morphologist in view of the present tendency in viewing the muscle. His division of the specimens into two classes appears to be acceptable, but this does not exclude a mixed class more or less analogous with the fibres of the "achselbogen." The abnormal additional origin of the gastrocnemius is one which might cause confusion in operative measures undertaken in this region. Such slips, arising like this one or from some adjacent part, are not excessively rare, and on that account perhaps deserve notice. Without definitely adopting the views of Testut and others, that these structures are always atavistic, it might perhaps be conceded that such extra-popliteal origins of the gastrocnemius are remnants of a more extensive or conjoined area of origin, pierced by the enlarging anastomosis which forms the popliteal artery.

CLINICAL RONTGENOLOGY.

THE phrase is ungainly, but it describes accurately enough the subject-matter of a much needed work from the Mount Sinai Hospital, New York, on all aspects of the radiology of the chest.[1] Drs. Wessler and Jackes make no extravagant claims and have not hesitated to point out the limitations of X rays in respect of diagnosis. The reader is warned against making a hasty diagnosis from the plate, for the blood-vessels and bronchi throw shadows which vary in different normal lungs and which should not be confused with shadows resulting from disease. Especially difficult to interpret are the shadows of the lung roots, and we agree with the authors that it is "particularly unfortunate that the shadows at the roots of the lungs have so often been made the basis for the diagnosis of pulmonary tuberculosis by roentgenologists." The authors are of the opinion that the earliest lesions in pulmonary tuberculosis appear in the infraclavicular region near the apex of the lung, and are nearly always unilateral. Hilum tuberculosis they believe to be very rare, and the so-called peribronchial phthisis to be the result of shadows of dilated blood-vessels and lymphatics. For the early diagnosis of pulmonary tuberculosis fluoroscopy is important as it will show deficiency of aeration at an apex and also abnormalities in the movement of the diaphragm, but shadows due to areas of disease are more easily seen on the plate. The authors state that an area of infiltration situated near the surface of the lung must be at least 4 mm. in diameter to cast a shadow, and the deeper the disease is situated the less clearly will it be seen. There are numerous plates showing pulmonary tuberculosis in all its stages, and of special interest are the three plates illustrating a case of acute pulmonary tuberculosis in its early, middle, and late stage. Undoubtedly X rays are of great value in the early diagnosis of pulmonary tuberculosis, but the history and condition of the patient must be taken into account, for similar shadows may be cast by non-tuberculous conditions. The question as to whether a lesion is active or arrested should, we are told, be

[1] Clinical Roentgenology of Diseases of the Chest. By H. Wessler, M.D., Adjunct Physician and Associate Roentgenologist, Mt. Sinai Hospital, New York; and Leopold Jackes, M.D., Roentgenologist to the hospital. Troy, N.Y.: The Southworth Company. 1923. With 430 plates. Pp. 560.

wisely left to the clinician. In discussing advanced tuberculosis it is shown how sometimes blood-vessels or pleural adhesions may cast shadows closely resembling cavities, and these shadows are accentuated by pneumothorax. It is unfortunate that X ray findings are not more frequently compared with post-mortem results, for by this means alone could the real meaning of the various shadows be put beyond doubt. Dr. Homer L. Sampson in a recent article [2] describes an experiment in which ten guinea-pigs were inoculated with tubercle bacilli by inhalation and killed at three-day intervals after the tenth day. X rays showed small shadows after the sixteenth day which proved to be tubercles. He does not think the shadows of tuberculosis absolutely typical of the disease, but they usually form a characteristic picture. The article is well illustrated by a series of 16 radiograms. Such works as these are welcome because, although the X rays are of importance in chest work, the clinician is as apt to underrate their value as the radiologist is to exaggerate it.

FOOT-AND-MOUTH VIRUS AND MONKEYS.

ATTENTION was called last week to the probable susceptibility of rodents to the virus of foot-and-mouth disease. A short paper in the most recent number (December, 1923) of the *Annales de l'Institut Pasteur* relates certain preliminary attempts by MM. Menzincescu, Baroni, and Calinescu, carried out between December, 1913, and June, 1914, to transmit the disease to other animals. All experiments upon cultivation, using most of the media and special techniques which have from time to time been devised for the culture of delicately growing organisms, then gave entirely negative results. In a further series of experiments attempts were made to grow the virus in collodion sacs within the peritoneal cavity of various animals, a procedure which has proved successful in the case of certain other filtrable viruses. In no case was success achieved, but, on the contrary, the virus rapidly became ineffective under these conditions and was presumed to have died. In other experiments Chamberland bougies were filled with virus-containing fluid and introduced into the peritoneal cavity of susceptible animals. In these cases the animals speedily contracted the disease, presumably by penetration of the virus through the porous walls of the filter. The fluid contained within the filter candle was found to retain its infectivity after a sojourn of eight days in the peritoneal cavity. Attempts to transmit the disease to rabbits, by various routes successful in other diseases, altogether failed, but in seven cases in which the virus was injected into monkeys there appeared, after an incubation period of three to five days, a vesicular eruption affecting the skin and mucous membranes, accompanied by a brief access of raised temperature. It would seem, therefore, that such animals are definitely susceptible, and if this is found to be the case at the hands of other workers it should prove a valuable step forwards in the investigation of a baffling malady.

TUBERCULOSIS IN INFANCY.

Dr. Norman B. Capon,[3] hon. pædiatric physician to the Liverpool Maternity Hospital, who records a remarkable case of tuberculosis in infancy, remarks that in most examples of tuberculosis at this age the disease has been acquired after birth either by inhalation or ingestion of tubercle bacilli. The present case, in which death occurred on the forty-first day after delivery, illustrates the difficulty in deciding by what route infection had taken place. The mother, aged 29, was admitted to hospital to undergo Cæsarean section for pelvic deformity. Her previous five labours had been instrumental and had resulted in stillbirths. Cæsarean section was performed and a full-term and apparently normal infant, weighing 8 lb. 12 oz., and measuring 20 in. in length, was delivered. The placenta, umbilical cord, and membranes were macroscopically normal and were not saved for microscopical examination. The mother's temperature rose to 101·6° F. on the day after the child's birth, and ran a remittent course until death, which occurred 44 days after delivery. The autopsy showed that death was due to acute miliary tuberculosis, tubercle bacilli being found in the lungs, brain, spleen, kidneys, and uterus. The baby was breast-fed for a few days after birth, but as the mother's temperature did not fall, artificial feeding was substituted. The child, however, remained in contact with her mother for the first 25 days of life. When first seen by Dr. Capon 33 days after birth the child was marasmic and of a bluish colour. There were no physical signs of lung disease, but the abdomen was distended and the liver and spleen were enlarged. Wasting became more pronounced, pyrexia developed and continued until death. At the autopsy the principal morbid changes were found in the lungs, spleen, and liver, which showed scattered throughout their substance tuberculous masses of various sizes, most of which had undergone necrosis and caseation, except in the lungs, where no caseation was found. The mesenteric glands showed almost complete necrosis and caseation at their centres. Small areas of caseation were also found in the thymus. Dr. Capon discusses the possible channels of infection by which an infant may become tuberculous—viz., germinal infection, intra-uterine infection, intra-partum infection, and neo-natal infection—and while maintaining that it is impossible to state definitely the route by which infection occurred, especially in view of the fact that the placenta was not examined histologically, points out that the advanced stage of the lesions found in the child's viscera supports the possibility of intra-uterine infection. There is no satisfactory treatment for tuberculosis in the newborn, but prophylaxis demands that a baby born to a mother with active pulmonary tuberculosis should be removed from her as soon as possible and isolated from other babies.

MALTA FEVER AND EPIZOÖTIC ABORTION.

THE organisms responsible for Malta fever in man and epizoötic abortion in cattle are hardly distinguishable from one another by laboratory tests, and there is evidence that vaccination with one may protect against the other. Epidemiologically the distinction is quite clear: the one causes Malta fever in goats and men, while the other is still more widely prevalent in cattle and to some extent in pigs. But there is no evidence that Malta fever ever gives rise to epizoötic abortion or vice versa; the diseases breed true, though the organisms are nearly identical by other criteria. It has been suggested that the old agricultural custom of running a goat with cattle in the fields as a preventive against abortion may represent a realisation of a close relationship and the possibility of prophylactic inoculation; some notes on the practice in different parts of England and Scotland have appeared in our columns.[1] Careful work[2] by Miss Alice Evans on a large number of strains from various sources has shown that the organisms can, by agglutination and absorption tests, be divided into two main groups: *Brucella melitensis melitensis* from goats and man, and *B. melitensis abortus* from cattle and pigs; the differences are quantitative rather than qualitative, and are not great. In the *Johns Hopkins Hospital Bulletin* (1924, xxxv., 6) Dr. C. S. Keefer gives a very full account of one of the few cases of Malta fever which have been identified in America. The clinical course was typical, and the organism was repeatedly isolated by blood culture. The patient had never been abroad, nor for a long time outside the city of Baltimore, and had had no contact with goats. What is of particular interest is that Miss Evans found the strain isolated from

[2] The Use of X Rays in the Differential Diagnosis of Pulmonary Tuberculosis, the British Journal of Tuberculosis, January, 1924.
[3] British Journal of Children's Diseases, October–December, 1923.

[1] THE LANCET, 1922, ii., 516, 743.
[2] Ibid., 1922, ii., 979.

him to belong to the *abortus* subspecies. Epizoötic abortion is common enough in the Eastern States, and almost everybody is apt to come into contact with it through milk. We have here, then, apparently for the first time, an example of variation in the pathogenic relations of this organism. Cases cannot be common. But they may be less rare than is supposed, for the symptoms of human infection are sometimes equivocal, especially if the possibility of Malta fever is not in mind. A certain number of the obscure pyrexias may turn out on fuller and specific examination to be *abortus* infections, the possibility of which is almost universally present.

The other familiar example of the pathogenic distinction of almost identical organisms is found in plague and pseudo-tubercle. The organisms are indistinguishable and to a certain extent cross-vaccination succeeds. But plague is a disease of rats, and pseudo-tubercle a disease of guinea-pigs, and there is no direct evidence that one may become the other. It is, however, obviously possible that some of the obscure outbreaks of plague, such as that in Suffolk a few years ago, may have been due to a variation of the pseudo-tubercle bacillus in that direction—a possibility not much more difficult to believe than the well-known facts of variation in cultural characters.

READING IN BED.

READING in bed, as Becky Sharp might have said, "may be wicked, but it's natural," and many people confess to being incurably addicted to the practice. Books to be read in bed naturally divide themselves into two classes, those which do not keep the reader awake and those which provoke an exposition of sleep. Mr. Osborn's lists of books,[1] including those from which excerpts are given, all fall into the former class, except, somewhat oddly to our thinking, Malory. Of the latter class we can quote two, of which we feel certain Mr. Osborn will be glad to know—namely, the Rev. Robert Montgomery's poem "Woman: The Angel of Life," and a book of surpassing excellence in its way—namely, "Mogg's 10,000 Cab Fares." The former work, as Thackeray discovered long ago, has the great advantage that it makes just as good sense read from the end to the beginning, as from the beginning to the end, while the latter not only is the sole work of literature which appealed to Mr. Soapy Sponge, but in addition can transport the reader to realms of dreams in which, as is the way of dreams, he may traverse London in several directions at once. Let the sleepless reader once begin "Acton five, from the end of Oxford Street and the Edgware Road—see Ealing; Edmonton seven, from Shoreditch Church—'Green Man and Still,' Oxford Street, Shepherd's Bush and Starch Green, Bank and Whitechapel . . ." and sleep will come. Mr. Osborn's introductory essay is delightful reading, especially his précis of the Russian novel, but all the same we do not think he can have read Chekhov. The authors from whose works he gives selections are mostly not later than the eighteenth century and include such masters as Thomas à Kempis, Robert Burton, Apuleius, Froissart, and Sir Thomas Browne, while of the two moderns Mrs. Gaskell is represented by the till recently unpublished record of the childhood of her daughter and a very charming record it is. The latter half of the book is made up of a fragment from Anatole France's "Clio," a paper on "Dreams" by Lady Grey of Fallodon, an admirable antidote, as Mr. Osborn says, to the Freudian theory on the subject, and sundry papers by Mr. Osborn himself, all of which are restful and pleasant reading. One of these deals with Christmas carols, again delightful to read in bed or anywhere else, but which cannot be written now, and another with epigrams of which Mr. Osborn quotes a few, both ancient and modern. We will add one, known to few, but all the same singularly happy. All Eton men whose memory of masters goes back to the "seventies" of the last century will remember Russell Day, a great mind in a small body. One of his relatives married a Miss Week, and Day handed in the following at the wedding:—

> "A Day the More a Week the Less,
> Yet Time must not complain,
> There'll soon be little days enough
> To make a week again."

Another paper discourses pleasantly on diaries, in which Mr. Osborn naturally gives the palm to Pepys. But we recently came across another diary or excerpts from it, rescued from oblivion by Mr. R. L. Hine in his book (a bedside book of the best class) called "The Cream of Curiosity." The diary in question was kept by Justinian Paget, born in 1610, in which we find such entries as the following: "I lay in bed musing till 9 o'clock which caused a dulness in my head with losse of so much time. *Resolve* that wakening at 5 o'clock I will knock with my bedstaff to waken Elias, who shall presently rise and make a fire whilst I rubb my body and then I will presently skip out of bed." A marginal note adds, "I must have ye tinder box with me."

Sleeplessness is a sore trial to many, and even though we are indebted to the condition for some masterpieces of literature such as Statius's poem to Sleep, it is a condition to be combated. Mr. Osborn's book will certainly be a boon to the sleepless.

[1] Night Caps; The Gentle Art of Reading in Bed Explained and Illustrated. By E. B. Osborn. London: G. Bell and Sons, Ltd. 1924. Pp. 341. 7*s.* 6*d.*

ULTRA-VIOLET IRRADIATION OF THE MOUTH.

AT a meeting of the Odontological Section of the Royal Society of Medicine on Jan. 28th Mr. P. S. Campkin showed an apparatus for applying ultra-violet rays in the mouth, invented by Mr. R. B. C. Sheridan, Barrister-at-Law. The device[1] consists of a mirror and two quartz lenses of different powers, all of 41 mm. diameter, and mounted on short handles connected by a pivoted hinge. The mirror is adjusted so that the patient can see the interior of his own mouth when the lenses, which are permeable to ultra-violet rays, are arranged to focus the sun's rays on an area of about the size of a threepenny-piece. For irradiating areas in the front of the mouth the two lenses are superimposed; if a longer focal length is desired—e.g., for the back of the mouth—one lens may be pushed aside. Should sunlight not be available the light from a mercury-vapour or an arc lamp can be substituted. The device is intended to be used by the patient at home. Mr. Campkin stated that he had found ultra-violet radiation thus applied useful in promoting the healing of raw surfaces following extraction of teeth or the removal of cysts, as well as in marginal gingivitis and after excision of hypertrophied gums. Radiation is applied for a period of five to ten minutes two or three times a day. Mr. Campkin went on to suggest that the device might be useful as a prophylactic measure against pyorrhœa; adding that the exposure was so short as to eliminate any danger of burning. The device had received favourable comment from Dr. Murray Levick, who thought it should prove useful for the treatment of oral lesions. On the analogy of the use of ultra-violet rays for other conditions, it seems reasonable to assume that the healing of the oral tissues may be hastened by the use of these rays in the mouth. Personal equation comes much into play in estimating the value of such treatment, especially when it is ancillary to dental treatment of other kinds, and until a large number of cases have been treated by different observers, the actual therapeutic value must remain uncertain. Mr. Campkin alluded to the risk of burning, and we should like to have assurance from physicists and those versed in heliotherapy that burning is optically impossible. There is a wide difference between the use of an instrument under careful supervision in hospital and as a form of home treatment.

[1] The apparatus has been protected under the name "Oralight" lens, and can be obtained from Messrs. Pankhurst and Barritt, 56, New Cavendish-st., London, W., at a cost of 30*s.*

MANGANESE IN HARROGATE WATERS.

THE pharmacology of manganese as a constituent of many medicinal waters has not been the subject of extensive research. Though the amounts present are usually small, they are amenable to accurate measurement, and the chemical importance of the element is sufficient to warrant some discussion. Potassium permanganate is the only salt compound of manganese in the official pharmacopœia, and in this case it is not the manganese but the high oxygen potential of the acidic ion which is required in the prescription. Recent developments of colloid therapy have focused attention on manganese in the colloidal condition. Years ago it was more freely prescribed. As a cathartic the salts were given in combination with other purgatives such as senna, and in doses of 5 to 10 gr. it was prescribed as a tonic, sometimes in place of iron. It was also supposed to have an action on hepatic function, increasing the secretion of bile. Dr. David Brown has shown the action of sulphur water to be one of increased oxidation. "The evidence brought forward," he wrote,[1] "as to the stimulation of a ferment like the xanthin oxidase of the liver suggests that its principal effect may be brought about by a peroxidase." Mr. A. Woodmansey, M.Sc., analyst at the Harrogate Royal Baths, calls our attention to the fact that the Old Sulphur Water of the spa contains small amounts of manganese which may be responsible for the observed effects. The amount of manganese in the other waters is as follows:—

	Manganese (parts per 100,000).
Old Sulphur Water	0·03
Strong Montpellier	0·04
Mild Sulphur	0·025
Chloride of Iron	0·04
Crescent Saline	0·12
Tewit (Tuewhit)	0·044

The outstanding property of manganese, its activity as a catalyst in the promotion of oxidation, explains its effect on plant and mould growth. The oxidising enzyme of the lac tree has been found to contain much of the element, and it is highly probable that manganese may function as a peroxidase under certain conditions. The manganese content of the Harrogate waters is sufficient in quantity to merit an investigation of its catalytic possibilities. Work is now being done in order to find whether the manganese of imbibed waters is immediately excreted or retained by the body.

ON ŒDEMA.

IT was for a long time customary to consider œdema as a chapter in the pathology of lymph formation, and it was in this country sadly mixed up with the Starling-Heidenhain controversy about lymph flow; it was overlooked that the mystery of œdema is not why more fluid leaves the vessels for the tissue spaces, but why it stops there instead of draining away into the veins and lymphatics. During the last fifteen years or so—starting perhaps with the splendid chapter in Lazarus-Barlow's "General Pathology"—one has come to look on œdema as due to interference with the mechanism which regulates the distribution of water in the body between the blood, the lymph, and the tissue fluid. The main factors as far as we know which determine this distribution are the permeability of the capillary wall (as in histamine wheals) and the concentration of dissolved substances (as in salt œdema). Prof. L. Loeb has put together[2] an admirable conspectus of the subject from this point of view, discussing systematically the considerable volume of germane investigations made in recent years, and dealing fairly with the pros and cons of the various ideas which have been put forward to explain the common, and still the most complicated, cases of œdema in cardiac and renal disease. In the former class, for example, the meaning of Bolton's classical work in making the traditional mechanical explanation quite impossible is fully appreciated; in the latter, the possibility is raised at some length that the immediate cause of the accumulation of fluid in the tissues is not the failure of the kidney to excrete but the production by the kidney of something, possibly the soluble products of autolysed cells, which alters the permeability of the capillary walls throughout the body—a suggestion made by Chisolm ten years ago. The book is a solid piece of work, not very lively reading for the style is rather dull, but it not only sets out the state of present knowledge on the subject, but suggests many new lines of inquiry.

[1] Some Pharmacological Effects of Strong Sulphur Water. Proc. Roy. Soc. Med., May, 1911. David Brown, M.D.

[2] Edema. By Leo Loeb. Baltimore: Williams and Wilkins Company. 1923. Pp. 178. $3.50. Reprint of a quarterly part of Medicine, 1923, ii., 171.

THE LATE PROF. MARCUS HARTOG.

MANY members of the medical profession will have learnt with regret the recent death in Paris of Prof. Marcus Hartog, who for 41 years was associated as a teacher of biology with the medical schools of Manchester and Cork. He had retired from work for several years and had reached the age of 75. A versatile and learned writer, we were on many occasions the recipient from him of notes, generally in amusing vein, illustrative of quasi-medical points, his justification for appearing anonymously in a professional newspaper being that his long connexion with medical education had made of him "a perpetual student." The last such note, written in refutation of the public belief that the rocking cradle was bad for the infant is a good example of his shrewdness to detect the fallacies of popular theories:

"One great objection has been that rocking stirs up the pulpy brains. Now the brain and other liquids completely fill up the cavity of the skull, and, moreover, it is traversed by intersecting membranes. You can't agitate even water in a completely full vessel, and the brain is very much less fluid than water, or even gum-water; try the experiment and you will see the absolute futility of the theory. In the next place consider the zoological argument. The infant ape is carried about either clinging to the fur of its mother, or held in its arms, but despite the constant rocking it must get, its health doesn't suffer. The habits, and I may say the instincts, of women are all in favour of rocking. When a woman takes a child in her arms she at once begins swaying to and fro, if standing; when she walks, of course the child she carries is rocked. The Indian and Ceylonese mothers extemporise a hammock of a sheet suspended from a tree for the infant to sleep in, and from time to time give it a swing with the hand or foot. I think it very unfair that after the nursling has enjoyed some months of rocking with every movement of its mother, it should be suddenly deprived of its wonted passive exercise."

Prof. Hartog's equipment was remarkable. To an intimate acquaintance with zoology, botany, and even geology, he added the ability to read and correspond in five languages and was a keen and critical appreciator of music. Although his academic work was mainly in biology, he started his scientific career as assistant-director of the Ceylon Botanical Gardens.

AFTER-CARE OF TUBERCULOUS EX-SERVICE MEN.—The Minister of Pensions announces that arrangements have now been made to secure the coöperation of the local agencies of the Ministries of Labour and Pensions with the local health authorities in the after-care of ex-Service men suffering from tuberculosis. Six weeks (or as long as possible) before the tuberculous man's discharge from an institution, the notification of the pending discharge will be sent to the tuberculosis officer of the man's place of residence. Thereupon, special steps will be taken, on the one hand, so that, as far as possible, the patient shall not return to home conditions which are likely to prevent the satisfactory progress of the case or to cause a relapse; and at the same time, on the other hand, to do all that is possible to assist the man to obtain employment in a suitable occupation. So far as the man's home conditions are concerned, the tuberculosis officer and his staff, or the Tuberculosis Care Committee, if one has been established in the area, will, if these conditions are unsatisfactory, take such action as may be practicable to improve them. As regards the man's employment, if the tuberculosis officer considers that the man's occupation is unsuitable, he will furnish the Employment Exchange with a list of occupations which he considers not definitely unsuitable for the case. The Employment Exchanges will render all possible assistance in this matter, and special efforts will be made by the King's Roll Committee and by the Chief Area Officer and the members of the War Pensions Committee.

Modern Technique in Treatment.

A Series of Special Articles, contributed by invitation, on the Treatment of Medical and Surgical Conditions.

LVII.—THE TREATMENT OF ACUTE SEPTIC INFECTION: SEPTICÆMIA.

FOLLOWING infection of certain tissues by certain micro-organisms, the disease process is apt to spread rapidly, and sooner or later microbes extend beyond the site of primary infection and entering the blood-stream multiply therein, giving rise to septicæmia.

The tissues infection of which is specially prone to be followed by symptoms of general infection are bone (osteomyelitis); the uterus—e.g., puerperal sepsis; the skin and subcutaneous tissues—e.g., erysipelas, cellulitis, an infected wound; the middle ear and upper respiratory tract. In osteomyelitis the infecting agent is usually *Staphylococcus pyogenes;* of the remainder *Streptococcus pyogenes* accounts for the large majority.

The diagnosis of a generalised infection is often difficult on clinical grounds alone; the general condition of the patient is apt to be deceptive, particularly in the more acute cases. The diagnosis will be based on (1) a sudden rise of temperature and in pulse-frequency, both sustained, and perhaps (2) the occurrence of chills or rigors, and (3) the development of secondary foci—e.g., pulmonary infarct, pleurisy, or arthritis. The certain sign is the presence of micro-organisms in the blood-stream, but many cases are undoubtedly septicæmic in which blood culture is negative during life; further, it may be three or four days before a report can be received—time that cannot be spared in instituting treatment. The great value of blood culture is that when positive it yields the infecting organism in pure culture. Treatment in such cases is often of little avail, but in order that the patient may have the best possible chance it is essential that it should be started early, and for this reason it is far safer to treat any doubtful case as though it were septicæmia instead of waiting for the diagnosis on the result of blood culture.

Treatment may be considered under four headings:

1. *Local.*

Efficient surgical measures for drainage and elimination, as far as is possible, of the primary focus. The importance of this first step in the treatment of infective processes cannot be too strongly emphasised; the frequency with which it is overlooked is the justification for the italic type in which it is expressed.

The same remarks apply to secondary foci which may arise in the course of the disease, but in streptococcal cases an effusion into a pleural or joint cavity may usually be aspirated, unless the liquid be thick pus, on one or more occasions before drainage is advisable. Constant watch must be kept over the pressure points—gluteal, heels, elbows, &c.—for the development of subcutaneous abscesses which require immediate incision.

2. *General.*

(*a*) *Food and Hygiene.*—Good nursing is essential. An efficient nurse will get her adult patient to take at least 4 pints of assorted fluids in the 24 hours, and the patient may be allowed anything fancied in the way of solids, regardless of temperature; it is a mistake to limit the dietary entirely to slops. Meat, fish, chicken, vegetables, and plenty of fruit and eggs should be pressed. In those rare instances in which it is impossible to get solids down, four or five eggs beaten, during the 24 hours with Benger's, ovaltine, plasmon, jellies, and meat essence must be reluctantly substituted, a return to solids being made at the earliest opportunity. The mouth must be cleaned before and after every feed, and a little simple ointment applied to the lips will help to keep them moist. The bowels should be kept on the free side. Abundance of fresh air is essential, bed on a balcony continuously is the ideal, though but rarely attainable. Great care is necessary to avoid bed-sores; the back should be washed, dried, rubbed with hazeline solution or spirit, and powdered at least every six hours. Urinary output should be measured. When the temperature exceeds 103° F. the patient should be cradled; if it rises to 104° sponging with hot water (110°) will bring it down without causing the discomfort often associated with tepid sponging.

(*b*) *Rest.*—A detail often necessary to enforce. The patient, usually mentally alert and free from headache, must be kept quiet, visitors cut down to the minimum, and all movement in bed restricted as far as possible. Sleep is of the utmost importance and must be secured at all costs, and the patient should never be awakened for feeding or treatment. Insomnia, due more often to toxæmia than pain, may yield to ammonium bromide and chloral, or medinal, if simple nursing methods fail; the constipating effects of opiates can be overcome by salines and enemata.

(*c*) *Drugs.*—The administration of medicine, stimulant, and hypodermic is to be so arranged that they do not clash. The indication for drugs as a routine in the early stage is—

(i) to aid elimination,
(ii) to prevent heart failure,
(iii) to prevent abdominal distension and diarrhœa.

To this end sodium bicarbonate may be added to barley-water, and sodium citrate to fresh lemonade; half a drachm of the tincture of digitalis should be given in the 24 hours, and will save time should the necessity for sudden digitalisation arise as an aid to pituitrin and strychnine at a later stage. A small dose of hyd. c. cret. and salol or other so-called intestinal disinfectant may be given with advantage twice or thrice daily. Brandy should be started early, but never added to a feed—say 2 oz. in the 24 hours, half of which may be given at 9 P.M. in the hope of inducing sleep.

3. *Special Treatment.*

When the above items have been thoroughly attended to, but not before, the question of specific treatment must be considered. In the case of staphylococcal infection but little is to be hoped for on specific lines, but fortunately in streptococcal infections specific therapy is often of great value.

(*a*) *Sensitised Vaccine.*—Mervyn Gordon has shown by the absorption of agglutinin test that hæmolytic streptococci can be differentiated into three distinct types. The vast majority of pyogenic streptococci causing localised or general streptococcal infections, other than scarlet fever, belong to one and the same serological type. Hence a stock sensitised streptococcus pyogenes vaccine may be used with confidence in the majority of cases, and should certainly be employed in all until an autogenous one can be prepared. For an adult the dose of sensitised streptococcus pyogenes vaccine may well be 100, 250, and 500 million given subcutaneously on three successive days; after an interval of a few days, 250, 500, and 1000 million may be given in like fashion, or perhaps 100 million daily or every other day. Alternatively to the subcutaneous route 100 to 500 million sensitised vaccine may be injected intravenously combined with antistreptococcus pyogenes serum intramuscularly. Such tactics may induce a rigor; an "extraneous rigor" in such conditions is always of good prognostic import.

(*b*) *Antiserum.*—Provided the patient has not had serum administered before and is not subject to asthma, hay fever, or urticaria, antistreptococcus pyogenes serum should be given at once; polyvalent serum under such conditions is of comparatively little value. At least 50 c.cm. are injected intramuscularly into the thigh or flank and the dose repeated in 24 hours; in urgent cases serum may be diluted with an equal volume of sterile Ringer's solution or normal saline and given intravenously. Should the patient have

had serum previously or be an asthmatic, an intradermal test must first be done with the serum as a precautionary measure, and if hypersensitive, desensitisation with small doses must be carried out before the full dose is given.

(*c*) *Peptone.*—Nolf, of Liége, first recommended the intravenous injection of Witte peptone in septicæmia and severe septic infection in 1917, and it is undoubtedly a useful accessory to other forms of treatment. Judged solely by its immediate effect on the temperature chart, peptone in streptococcal infections would most times be regarded as of small account, but if the general condition of the patient is considered one rarely fails to be impressed by its worth, except in the very acute fulminating cases. It is the general condition and not the chart which must be taken as the guide to the size of the dose of peptone and the frequency of its administration; if it is of benefit a change will be manifest within 12 hours of the first injection though three or four may be required before the temperature shows signs of abating. Witte peptone is given as a 10 per cent. solution in distilled water and the initial dose for an adult is from 4 to 8 c.cm. It should not be given to asthmatics. The requisite dose of peptone solution is drawn into a record syringe fitted with a needle not larger than No. 26, to avoid the risk attendant upon a too rapid introduction of peptone into the blood-stream. The intravenous injection of 8 c.cm. should occupy at least two minutes, and during the operation the nurse keeps constant observation on the pulse-frequency, calling out the number of beats in each quarter of a minute; if this exceeds 35, or should there be any complaint of pain or discomfort by the patient, the injection is temporarily suspended, to be resumed, even more slowly than before, when such signs have moderated. In the majority of cases of acute infection in which a good result appeared to follow the intravenous injection of peptone, a rigor occurred within an hour or so of the first administration; in others the desired reaction was delayed until after the second or third dose. A rigor under such conditions is to be regarded as a favourable sign, and failure to react is of grave prognostic import.

The condition of the patient during the reaction may be alarming to the uninitiated; for a short time she may be cyanosed, restless, dyspnœic, and the pulse impalpable at the wrist; but these signs are of short duration and relieved by brandy, hot bottles, and a hypodermic injection of adrenalin or atropine sulphate.

The injection of peptone may be repeated in 48 hours, the dose being increased by 1 or 2 c.cm. Intravenous injection, whether of peptone, serum, or vaccine, should not be made directly after food has been taken.

Every case of streptococcal infection has to be judged on its merits, but for a case of, say, puerperal sepsis coming early under treatment the initial measures under this heading might be—

(*a*) 100 million sensitised streptococcus pyogenes vaccine subcutaneously;
(*b*) 50 c.cm. antistreptococcus pyogenes serum intramuscularly;
(*c*) 6 c.cm. 10 per cent. Witte peptone intravenously.

4. *Supplementary.*

(*a*) *Infusion.*—In those rare instances where vomiting and diarrhœa render the absorption of an adequate quantity of fluid impossible, and in which the toxæmia is overwhelming, infusion of Ringer's, or normal saline solution, to which 5 per cent. of glucose is added, may be of benefit.

(*b*) *Transfusion of Blood* is of undoubted value, especially in subacute cases. It should be employed particularly in those associated with severe anæmia, in which it enables the patient to obtain greater benefit from other lines of treatment.

A. E. GOW, M.D., F.R.C.P. Lond.,
Assistant Physician, St. Bartholomew's Hospital, London.

Special Articles.

SMALL-POX AND VACCINATION.

BY C. KILLICK MILLARD, M.D., D.SC. EDIN.,
MEDICAL OFFICER OF HEALTH, LEICESTER.

Dr. J. C. McVail's Address to Members of Parliament.

ON July 25th, 1923, at the special request of the Minister of Health, an address was given to Members of Parliament by Dr. J. C. McVail on the subject of small-pox and vaccination. From the orthodox point of view it must be admitted that few men could have been better qualified for the task than Dr. McVail, who has made such a life-long study of the subject. The address has since been published as a propaganda pamphlet by the Research Defence Society, and in view of the importance of the occasion and the publicity given to it, it is desirable that it should be scrutinised somewhat closely to see how far the statements made and the arguments used represent the whole truth on this highly complex and debatable question.

Dr. McVail divided his address into four sections, each introducing a definite proposition: (1) Small-pox is worth preventing; (2) small-pox can be prevented by vaccination; (3) small-pox cannot be prevented without vaccination; and (4) properly conducted vaccination is very safe.

1. *Small-pox is Worth Preventing.*

Dr. McVail begins by pointing out that there are two very different types of small-pox—one mild, the American type; the other severe, the Asiatic type. As an example of the former he instances the recent epidemic at Gloucester with only two fatalities; whilst as an example of the severe type he instances the outbreak in the Poplar Workhouse in 1922. This outbreak, he observes, was exterminated by "vaccination and isolation."

This brings me to my first criticism. Dr. McVail was addressing Members of Parliament. The question, and really the only question which concerns them, is the necessity or otherwise of *compulsory infant vaccination.* To tell them, without qualification or explanation, that it was "vaccination" which, with isolation, exterminated the Poplar outbreak was, I suggest, distinctly misleading, though I do not suggest that Dr. McVail intended to mislead. I suggest that many of his hearers would probably think that by "vaccination" he meant infant vaccination. Yet, as Dr. McVail must admit, such vaccination had really nothing to do with stamping out the outbreak. The initial case, the inmate, H. W., who caused the whole trouble, had been vaccinated in infancy, and so had the great majority of the cases (at least 46 out of 65) which contracted the disease—directly or indirectly—from him. Of course, what Dr. McVail meant by "vaccination" was *emergency vaccination of contacts*—a very different matter—and he might have told his hearers that the very success of this kind of vaccination constitutes a strong argument against the need for infant vaccination. He might have pointed out how extraordinarily successful the emergency measures taken in the Poplar outbreak—prompt isolation of cases with vaccination and surveillance of contacts—proved; with the result that in spite of the very alarming nature of the outbreak—the congested locality right in the heart of the East End, the fatal strain of the disease, the exceptionally large number of contacts, and the great extent to which infant vaccination had been neglected in the district—it was got under complete control almost at once. He might also have pointed out that if the initial case (the man, H. W., who worked in the laundry of the workhouse) had *not* been vaccinated in infancy it is almost certain that the man would not have had such a mild and

modified attack, in which event it is very unlikely that the nature of his illness would have escaped recognition. Had it been recognised he would at once have been isolated, instead of being allowed to continue working and moving about the institution; the other inmates and staff would have been vaccinated at once, and the whole outbreak would have been nipped in the bud. In fact, Dr. McVail might truthfully have said that so far from the practice of infant vaccination helping to stamp out the Poplar outbreak, it may reasonably be regarded as the indirect cause of the whole trouble.

Dr. McVail goes on to refer to the ravages of small-pox in pre-vaccination days and draws a harrowing picture of what took place in Kilmarnock in the period 1728–64. He tells us that 16 per cent. of the total deaths were due to small-pox, as were nearly all the deaths of young children. Not content with stating cold facts, he proceeds to paint an eloquent and pathetic picture. Here is a sample:—

"In respect of small-pox there were indeed three Kilmarnocks. One consisted of the population living over 4 or 5 years of age. These were now protected against small-pox; they had already battled with and overcome the disease fiend. Many would be disfigured; some would have suffered from injury or loss of sight; some would be afflicted in various ways by the sequelæ of the disease, but they were practically safe from future attack. The second Kilmarnock lay under the greensward of the kirkyard. These had been in the same battle with small-pox, but had lost their lives and were at rest. The third Kilmarnock was that community of little children who had been born since the last visit of the pestilence. Within four or five years of birth they had to meet and fight the most terrible physical foe they would ever encounter. Human affection was as keen then as now, and I ask you to imagine what would be the feelings of a mother when she was told that the truce of God had ended, and that the town was again invaded by small-pox."

I feel bound to point out that such eloquence is really quite irrelevant and is nothing more nor less than an attempt to create prejudice (of course, this is not intended in an offensive sense). We expect this sort of thing from a clever barrister, paid to plead a cause, but it is hardly what we expect from a man of science like Dr. McVail. Dr. McVail knows quite well that the conditions in this country at the present day, as regards such a disease as small-pox, are so totally different from what they were two centuries ago that to imply, as he seems to do, that but for vaccination we should to-day be exposed to the same danger really amounts to special pleading. He might at least have pointed out that, coinciding with the perfection of modern methods of prevention, and in spite of the steadily increasing neglect of infant vaccination throughout the country, small-pox has become, during the past two decades, one of the rarest of the zymotic diseases, and the mortality caused by it has been negligible. He might further have pointed out that the American type of small-pox, which has now appeared in this country, and about which so much alarm has been raised in the press and elsewhere—which, indeed, was presumably the cause which had led the Minister of Health to invite him to give the address—had none of the terrible characteristics which he had been describing so graphically. There is practically no loss of life, no disfigurement, no injury to sight, &c.; and as for the feelings of the poor mothers, he might have said that instead of terror the disease is now apt to inspire only contempt, so much so that it is difficult to get people to treat it seriously.

2. *Small-pox Can be Prevented by Vaccination.*

This is Dr. McVail's second proposition. What exactly does he mean by it, or, rather, what would his hearers be likely to think that he meant by it? If he meant that small-pox can be prevented *in the individual* by vaccination and revaccination as often as necessary to keep the individual immune, then I quite agree with him. But if he meant, or if his hearers thought that he meant (as most of them no doubt would think), that small-pox can be prevented —i.e., effectually controlled—*in the community* by a State system of infant vaccination then I submit the proposition cannot be substantiated. Dr. McVail says that time will not allow him to submit all the world-wide statistics and experience, the accumulation of 120 years, on which *faith in vaccination* is based, but he will tell, as briefly as possible, the nature of the evidence on which medical confidence rests. "In whatever way the data are questioned, from whatever angle the problem is viewed, the conclusion is the same." Incidentally, I may remark that "faith in vaccination" is one thing; up to a point I have as strong a "faith in vaccination" as Dr. McVail himself. But faith that any system of infant vaccination will effectually control small-pox is quite another thing.

The points he adduces to support his proposition are as follows:—

(1) The mortality from small-pox has been much less since vaccination was introduced. He admits that this in itself proves nothing. The mortality of plague, cholera, and various other diseases has also greatly diminished. But he suggests that "a comparison of places and times of small-pox diminution side by side with vaccination affords strong proof of causal relationship."

(2) The altered age-incidence of small-pox. This, of course, is a perfectly sound argument for proving that vaccination confers temporary immunity against small-pox on the individual. I submit that it is no evidence whatever that infant vaccination protects the community against small-pox. It may simply shift the incidence of small-pox from one age to another.

(3) In countries which are well vaccinated and revaccinated there has been much less small-pox than where vaccination has been neglected. Dr. McVail cites as the "outstanding example" the case of Germany. He has to admit, however, that the recent position of that country is "interesting"; I suggest that "disconcerting" would have been a more appropriate word. He then proceeds to explain why it is that Germany (which for years has been held up by provaccinists as the shining example of what can be done by compulsory vaccination and revaccination to abolish small-pox) has fallen so sadly from grace. In the six years, 1917–1922, he tells us, "the disease has attained quite appreciable prevalence." Nearly 11,000 cases of small-pox have occurred with a fatality-rate of 15·6 per cent. This is equivalent to *1716 deaths* from small-pox. He might have mentioned that in the same period the number of deaths from small-pox in England and Wales, without revaccination, and with infant vaccination seriously neglected, has been negligible.

We can only conclude from this that there is no longer a really outstanding example of a country which will support the thesis that "in countries well vaccinated and revaccinated there has been much less small-pox than where vaccination has been neglected." One may well ask, If Germany cannot protect herself by vaccination what country can?

Dr. McVail does not dare to suggest that in towns and localities in this country where vaccination has been neglected there is more small-pox than where the Vaccination Acts have been sedulously carried out. He knows well that he would have found it very difficult to substantiate this assertion. He knows that some of the best-vaccinated towns—e.g., Sheffield and Middlesbrough—have suffered from severe epidemics, and he knows, too, that there is at least one large town which has deliberately abandoned infant vaccination and yet has suffered no more than other towns from small-pox.

(4) In classes which have been well vaccinated and revaccinated there has been comparatively little small-pox. In support of this Dr. McVail cites the case of the small-pox nurses. Here, again, I quite accept the immunity of small-pox nurses as definite and convincing evidence that by vaccination (repeated as often as necessary) it is quite possible temporarily

to protect *individuals* against small-pox, but I submit emphatically that this is no evidence that infant vaccination will, or does in fact, protect the community. Thus, small-pox inoculation would be equally effective (though no doubt less satisfactory in other ways) in protecting small-pox nurses, but Dr. McVail will hardly suggest that this would be any evidence that inoculation would be effective in protecting the community. Further, vaccination would still be quite effective to protect small-pox nurses even though the immunity only lasted a few months, but in that case no one would suggest that it would have much effect in protecting the community.

(5) In towns where small-pox prevails more of the unvaccinated than of the vaccinated are attacked, especially if the vaccination is recent. This, I submit, again, only proves that vaccination confers temporary immunity upon the *individual*. It is no evidence that vaccination protects the *community*. Small-pox inoculation would show the same effect.

3. *Small-pox Cannot be Prevented without Vaccination.*

Again it is necessary to ask just what Dr. McVail means by this statement. He may mean (though I doubt if the majority of his hearers would think that this was what he meant) that it is impossible effectually to control small-pox without having a handful of vaccinated doctors and nurses to handle the disease and without vaccinating contacts. Even in this sense the statement is not really justified, because, of course, if there were no such thing as vaccination we could quite well protect our small-pox staff by inoculation, which would be equally effective if much less convenient. And as regards contacts, if these are kept under close surveillance it is very rarely that they spread the disease, whether vaccinated or not. Vaccination of contacts renders valuable help in reducing the total number of secondary cases, but I submit that it is certainly not essential for the control of the disease.

But if Dr. McVail meant that it is impossible effectually to control small-pox without vaccination of the general population—and I suggest that this is the sense in which it is probable his hearers would understand him—then the statement is still less justifiable. The whole trend of the evidence of the last two decades tends to show that it is quite possible effectually to control small-pox without recourse to general vaccination. Small-pox—at any rate the severe Asiatic type of small-pox—has been controlled with such success, in spite of the increasing neglect of vaccination, that the mortality from the disease during the past 18 years has ceased to be an appreciable factor in our vital statistics. Surely, the experience of places which have largely abandoned vaccination points definitely to the same conclusion. It is rather remarkable that Dr. McVail made no reference in his address to the important experiment which has been carried on in the city of Leicester for the past 40 years. Does he really think that this experiment has no bearing upon the question at issue? He was not always so reticent. If he had been quite frank—if he had wished to put an impartial and unbiassed statement before his hearers instead of a one-sided propagandist utterance—he would surely have told them something about Leicester's "gigantic experiment" (as a former editor of the *British Medical Journal* called it) and of his own confident prediction that it would lead to inevitable disaster. He might have told them that in his classical work, "Vaccination Vindicated," published in 1887, in referring to the action of Leicester in setting the Vaccination Acts at defiance, he had written:—

> "The antivaccinators of Leicester . . . having to a great extent thrown off the armour of vaccination, are waging a desperate and gallant, though misguided, conflict against the enemy. . . . But . . . in Leicester, when its time arrives, we shall not fail to see a repetition of last century experiences, and certainly there will afterwards be fewer children left to die of diarrhœa. It is to be hoped that when the catastrophe does come, the Government will see that its teachings are duly studied and recorded. . . . Leicester has had little chance of getting its immunity tested. When another great outbreak occurs among the susceptible population of England it will be time enough to see how Leicester comports itself under the ordeal."

This was 36 years ago. At that time it was reasonable to suggest that there had been insufficient time for the experiment to be properly tested. It had only been in operation a few years. But this plea can hardly be put forward to-day. During the years which have since elapsed less than 10 per cent. of the children born in Leicester have been vaccinated. Small-pox has been repeatedly introduced into the city, both in the mild and severe forms, and there have been three epidemics. Yet in the 36 years, out of an average population of 200,000, there have been only 51 deaths, an average of less than two per annum. Certainly, there has been no "catastrophe" such as Dr. McVail expected. Compared with the experience of other large towns, such a result cannot be regarded as at all unfavourable. Indeed, compared with certain well-vaccinated towns, it is highly favourable.

I am not blaming Dr. McVail because his prophecy has not come true. He only believed what almost the entire medical profession at that time believed, and honestly believed. But having prophesied and lapse of time having proved his prophecy mistaken, it is surely necessary that he should reconsider the premiss on which he based his prophecy. That premiss was that it is impossible to prevent small-pox without vaccination. And yet we find him, at an important gathering of the legislators of the Realm, repeating this statement, as dogmatically as ever, and without any reference to his previous mistake. Let me ask Dr. McVail one question: Supposing the Leicester experiment had resulted as he expected it would result; would he have made no reference to it? Would he have regarded it as of no significance? I think not. The fact is that the experience of Leicester constitutes a very valuable "control" experiment, and the importance of the "control" experiment is well known to every student of science.

4. *Properly Conducted Vaccination is Very Safe.*

The safety of vaccination is Dr. McVail's last proposition, but he is careful to qualify the statement by saying "properly conducted." But if vaccination is not properly conducted, whose fault is it? Presumably, members of the medical profession, who alone perform the operation. That doctors are sometimes careless is just one of the risks attaching to vaccination which make parents object to it. But Dr. McVail may urge that one cause of danger from vaccination is that of dirt getting in after the operation. This again, in the crowded homes of the poor, must surely be regarded as one of the inseparable risks of vaccination. What consolation is it to the parent of a child who is suffering from a septic arm following vaccination to be told that it is not the vaccination which is to blame but the carelessness of the doctor or mother?

Dr. McVail says that the chief danger from vaccination feared a generation ago was that syphilis might be conveyed by arm-to-arm vaccination, but he omits to mention that this danger was strenuously denied at that time by the medical profession; or that the Local Government Board actually issued a pamphlet, since withdrawn, entitled "Facts Concerning Vaccination for the Heads of Families," in which it was confidently asserted that "the fear that a foul disease may be implanted by vaccination is an unfounded one." Dr. McVail admits that the late Jonathan Hutchinson proved that the danger of syphilis being conveyed by arm-to-arm vaccination was a very real one, but he points out truly that by the substitution of calf lymph for human lymph this particular danger has been entirely overcome. He omits to mention, however, that many doctors believe that calf lymph is more apt to cause "bad arms" and severe constitutional disturbance.

Dr. McVail goes on to say that "nothing in the world is absolutely safe. A scratch of a pin may open

the door to erysipelas or lock-jaw, . . . and the vaccine vesicle may become infected septically or by erysipelas as in the case of any other wound. Such accidents, however rare, are most deplorable, and even if they are due to the fault of the incompetent or careless mother there cannot but be the deepest sympathy for her baby or herself." Incidentally, one wonders in what proportion of vaccination accidents the unfortunate mother can fairly be blamed, bearing in mind the conditions existing in poor homes? But I will let that pass. Dr. McVail might have mentioned to his hearers in this connexion a series of disasters which occurred in the State of New York a few years ago as a result of which it was decided by the State Legislature virtually to repeal the enactment which made universal vaccination compulsory.

Dr. McVail might properly have pointed out also that whilst the *proportion* of vaccinal injuries may be small, yet in the aggregate they are far from inconsiderable; and that now the risk of small-pox has been so enormously reduced the relative risks of vaccination and of small-pox may reasonably be compared. He might have mentioned that it frequently happens that the annual deaths resulting from the effects of vaccination actually exceed the deaths from small-pox. Indeed, if he takes the last 18 years, 1906–23, he will find that the deaths of unvaccinated persons from small-pox have been less than the deaths from vaccination. I think that this fact would have surprised some of his audience.

Just one more point before I conclude. Dr. McVail says, on p. 13: "In Britain, indeed, vaccination has never been 'compulsory.' Such a title is a misnomer. The Acts have never sanctioned a child being taken from its mother's arms and forcibly vaccinated." Surely, this is a verbal quibble hardly worthy of Dr. McVail! At one time vaccination was as "compulsory" as it was possible for a determined administration to make it so. In one city alone (Leicester) there were 1154 prosecutions in a single year (1881) and by the year 1886 the total number had mounted up to over 6000. Of the parents prosecuted 64 were imprisoned (after refusing to pay fines), 193 suffered distress warrants upon their goods, whilst a sum of £2388 was levied in fines and costs. If this was not "compulsion," what was?

Conclusion.

To summarise the chief of the above criticisms:—

1. In contending that small-pox is worth preventing it is quite irrelevant to cite the ravages of small-pox two centuries ago. However interesting historically, such facts have really no practical bearing upon the problems facing sanitarians to-day. In those remote times the principles of modern preventive medicine were neither understood nor practised.

2. The serious outbreak of small-pox in Poplar Workhouse last year, so far from being an argument in favour of infant vaccination, illustrates very remarkably one of the chief drawbacks to such vaccination—viz., its tendency to encourage the spread of small-pox by masking its true nature.

3. The statement that small-pox can be prevented by vaccination is true in the sense that vaccination has the power of producing temporary immunity to small-pox in the individual. But it has never been proved that small-pox can be prevented—i.e., effectually controlled—by any system of infant vaccination, however thorough. All the arguments adduced by Dr. McVail to substantiate this part of his case in reality only prove that vaccination produces temporary immunity in the individual.

4. It is very doubtful whether the statement that small-pox cannot, or could not, be prevented without vaccination is justifiable. The experience of this country during the past two decades, since modern methods of dealing with disease have been in vogue, certainly appears to point to the opposite conclusion.

Dr. H. H. Taylor, of Hove, has been placed on the Commission of the Peace for the borough.

CHANGING FACTORY CONDITIONS:

RISING STANDARDS AND FUTURE DEVELOPMENT.

I.

THE present Factory Act, which marked a great advance upon any of its predecessors, has now been in operation for over 20 years, and a good many changes have been effected under its powers. They have been 20 years, moreover, of remarkable developments in other directions, and they have witnessed the rise of voluntary agencies and of voluntary movements which are affecting profoundly industrial life. They would in any case have been years of unusual importance because they include the years of the war, which left a deep mark upon industrial life as upon every department of human life throughout the world. It is therefore suitable that some attempt should be made to review the changes which have taken place and to note present-day tendencies. This is the more important in view of the likelihood of the introduction of a new Factory Bill at no distant date.

The Rising Standard of Health.

The health of the workers, of some sections more directly than of others, has been an object of factory legislation from the time of that first modern industrial enactment, the Health and Morals of Apprentices Act, 1802, passed six years after the Manchester Board of Health (a voluntary association) had called attention to the injurious effects on young children of work in the cotton mills. Regard for health was one of the main arguments for the limitation of hours in respect, first of children and later of women and young persons; and limitation of hours was in effect the only measure proposed for many years. It was not until 1844 that the fencing of shafts and of gearing was required in the interests of the safety of workers; it was another 20 years before a Factory Act contained any provision as to sanitation and ventilation, and then the Act, that of 1864, only applied to certain trades which were considered to be specially unhealthy. The beginnings of control over sanitation are to be found in the Public Health Act of 1848, but it applied only to a few populous centres. The Public Heath Act of 1866 gave a wider supervision. But it is worth noting that right up to 1901 there was no statutory provision as to general ventilation in factories, as distinguished from the removal of dust or fumes engendered in a process of manufacture. Nor to this day is there any general provision as to lighting.

Factory legislation has gone along two main lines: there has been a steady growth of provisions for general well-being, covering more and more conditions and extending to more and more categories of workers. And at the same time there has been special attention paid to unusual dangers to health or to safety, or to the necessity of protecting classes of workers most likely to suffer. Along these lines there has been substantial progress. It may be assumed that there will be in the future, as there has been in the past, need for both general and intensive study and for both general and special supervision of factory conditions.

The Dangerous Trades.

Legislation for trades especially dangerous to health dates back to 1864, when employers in them were given the power of making regulations for their workpeople, subject to the approval of the Home Office, and of enforcing them by fines, a measure which would meet to-day, it may be assumed, with most strenuous opposition. The making of regulations was transferred to the Home Office by the Factory Act of 1891, and the powers given then and increased in 1901 are the basis of the very complicated codes of special regulations applying to dangerous trades to-day. The compulsory notification of industrial poisonings began in 1895, so that from that date we have fairly reliable statistics by which to gauge the

success of the regulations. The yearly returns form clear evidence of a substantial improvement, for whilst notifications are certainly not less complete than they used to be, and whilst the list of diseases notifiable has been extended, the number of cases shows a marked diminution in an increasing population. Phosphorus poisoning has practically disappeared; arsenic poisoning has been reduced to very small dimensions; and whilst the figures relating to mercury are not quite so satisfactory, they compare very favourably with pre-war years. Anthrax still remains a very serious danger, both here and abroad, and it is receiving careful consideration from the staff of the International Labour Office. Toxic jaundice, made notifiable in 1915, was almost entirely a war disease and it has disappeared with the war. As to the two industrial diseases recently made notifiable, chrome ulceration and epitheliomatous ulceration, it is too early to speak. But the poisonings already mentioned are, of course, all of them put together small in the total number of poisoning cases, of which a preponderating number still are, as in the past, due to lead. It is very satisfactory to note that the number of cases of lead poisoning notified has been reduced to something like a quarter of what it was in 1900. It is not the case, unfortunately, that the number of fatalities has diminished in the same proportion; there were 26 fatal cases in 1922 and 23 in 1921, as against 38 in 1900 and 31 in 1899. On looking into the detailed figures it is obvious that whilst in most of the industries employing lead it has been found possible to reduce immensely the amount of ill-health and the number of fatalities, in one particular industry—namely, the making of china and earthenware—there has been as yet no substantial reduction. There is also grave reason to be uneasy about the continued prevalence of lead poisoning among house painters and plumbers, who do not, however, come within the scope of the Factory Act.

Very wide powers are given to the Home Office under Section 79 of the Factory Act, and codes of regulations are in force in about 40 different trades, with yearly addition to the number. The commonest requirements are exhaust, or other special ventilation; the supply of protective clothing, which in many cases includes respirators; the provision of washing facilities, and in a few cases of baths; of cloak-rooms and of mess-rooms. Special attention to the cleanliness and good repair of floors is often required. Periodic medical examinations are ordered in some dozen trades. Women are excluded from a few processes,* young persons from a good many more.† In three cases work is only allowed on certain processes for short spells: they are the use of carbon-bi sulphide in the india-rubber industry, work in dry chambers and condensing flues in lead-smelting, and dipping and one or two other processes in pottery. It is worth noting that the limitation of hours applies to men as well as to women and young persons. Among regulations in different industries we have insistence on the provision of first-aid boxes where, as in work on chemicals or on horsehair, cuts and sores might easily be poisoned or infected; but, so far as health is concerned, the kinds of regulations mentioned cover substantially the field. They do, speaking broadly, enforce a special and detailed attention to hygiene in those trades where the penalties of neglect would inevitably be severe.

Welfare Orders.

In the stress of war, when the substitution of women for men and the urgent call for rapid production opened the eyes of many people to the need for conditions in the factories more favourable to health and to efficiency, there passed through Parliament, with little notice and practically no opposition, an Act with a curious title, the Police, Factories, &c. (Miscellaneous Provisions) Act, which gave new and far-reaching powers to the Home Office. For the first time they were able to prescribe conditions of welfare, as distinct from general safety and sanitation, even in the absence of any special danger; and there began to be built up for different industries a series of orders similar to those which had come into force during the past 25 years in the "dangerous trades." Welfare Orders have been made so far for about 15 trades. Provision of cloak-rooms and of mess-rooms, of protective clothing, and of first-aid boxes, are the most common requirements. In one or two industries—e.g., in fruit-preserving—seats must be provided, in some processes for all workers, in other processes for women only. For those who are engaged in the gutting of herrings there must be a rest-room. By one of the earliest orders under this Act there must be in *every*‡ factory a supply of drinking water.

Changes in Administration.

It is one thing to pass laws and to make regulations, and quite another thing to get them carried out. The changes in the administration of the law have been at least as important as the changes in the law itself. There is the increasing specialisation of the factory inspectorate, the doubling, for instance, of the medical staff since 1910, and the appointment of the first woman medical inspector in 1921. There has been an immense growth of coöperation between the factory inspectorate and the organisations of employers and of workers. In the annual report for 1922, Dr. J. C. Bridge records an interview with the officials of the Dyers' Union, Leicester, with regard to the Chrome Dyeing Welfare Order:

> "One of the main objects of the interview, as put forward by the officials, was that they wished to be in a position to explain to their members the use that should be made of the provisions of the Welfare Order. For this reason, he considered the interview very valuable, for one of the difficulties of administering the Welfare Orders is that the men fail to take advantage of the provisions made under them. An attitude such as that shown by this Union marks a very great advance."

Such an advance is being made in many quarters. If the briquette makers of South Wales, who are liable to pitch-cancer, are making any use of the baths provided, and are submitting to a periodical medical examination, it is due to the persistent advice given to them by their trade-union leaders. (In this particular case the regulations are merely by agreement of the Home Office with those engaged in the industry; they are not yet statutory.) It would be possible to cite many more instances of this kind. It means in many cases that the work done by the Joint Industrial Councils of some industries brings an intelligent and whole-hearted compliance with regulations which might otherwise be largely inoperative.

The Influence of the War on Welfare Work.

Welfare work, as distinct from statutory provision for welfare, had existed in a minority of factories for many years before the war, but it was the war which brought it into prominence, made it widespread, and gave to the welfare supervisors the status of a profession. The trade depression, as well as the relaxation of Government pressure, have produced a set-back, but there can be little doubt that it is only temporary or as to the far-reaching effects produced upon the health of the workers. It is in itself a very great thing for the women and girls to have a well-educated woman in a place of authority; she will attend to a hundred details, separately perhaps quite small matters but cumulatively of importance, which were neglected in the past because it was no one's special business to look after them. It may seem to some a trifle that there should be a woman responsible

* *Women* are excluded from casting brass, from some processes in the manufacture of electric accumulators, from smelting lead, the manufacture of paints and colours, and some processes connected with pottery.

† *Young persons* are excluded from the manufacture of chromates, some processes in the manufacture of electric accumulators, vitreous enamelling, use of non-disinfected horse-hair, fume processes and lead processes in the manufacture of rubber, smelting lead, dipping, and other processes connected with pottery, tinning of hollow ware, and heading dyed yarn.

‡ Unless it employs less than 25 persons.

for the proper condition of the sanitary conveniences, but those who have any knowledge of the habits of factory girls or of the evil effects of chronic constipation, will not think so. It is a matter of importance, too, that there should be someone on the look-out for marks of over-strain; that there should be a woman to whom the women can talk freely; and that there should be a rest-room where women and girls can go at those times when a short interval wisely spent can make such a difference. There are many other things which the welfare supervisors do which have a marked effect upon health; they are responsible for seeing that the workers can get a good meal at a reasonable price, and in comfort; they should arrange also for convenient means of transit where the workers come from a distance. There are also benefits, such as free dental treatment, given by some firms, but they are exceptional and probably they are likely to remain so; responsibility for the care of the teeth of its workpeople cannot be expected to fall normally upon a firm.

The Reduction of Hours.

The greatest of all the changes which have taken place in factory life in recent years has been the almost universal reduction of hours which took place in the months following the Armistice. In about six months six million workpeople had their normal weekly working hours reduced by an average of about six and a half hours per head. It was a very remarkable social phenomenon, this yielding without coercive legislation and without a bitter industrial struggle, of claims which had been vainly made and stoutly resisted for at least half a century. War-time experience had wrought a notable conversion of the employers. There had been a huge sale of the memoranda issued by the Health of Munition Workers Committee, and their findings had been written up in scores of newspapers and magazines. In December, 1918, in countless factories, great crowds were swarming through the gates at 6 A.M., to pour out again at 6 P.M., as they had done for decades past. By Easter 1919 this was exceptional.

Of all the conditions injurious to health from which our industrial workers have suffered the most common and one of the most serious has been continued overwork. On this point the final report of the Health of Munition Workers Committee was emphatic:—

> Apart from exceptional occupations which are in themselves injurious, the principal of the undesirable conditions, the most radical and persistent, the commonest is that of *long hours*.

Sir James Paget is quoted:—

> "You will find that fatigue has a larger share in the promotion or transmission of disease than any other single causal condition you can name."

At the same time as hours were shortened, there came in many cases automatically a curtailment also of the length of spells of work; and there has been a growing recognition of the value, strongly emphasised in the report just quoted, of rest-pauses. But spells of work are still in a good many cases excessively long.

Child Labour.

Another change amounting to a reform came by legal enactment and not without a certain amount of opposition: children disappeared at last from the factories. The injury done to boys and girls by premature work had been deplored and denounced a thousand times, and it had been greatly diminished by successive enactments. The Women, Young Persons, and Children Act of 1920 put an end to it, and within two years of its passing there was no longer a half-timer in our factories. We are still putting an excessive strain upon many of our adolescents, but that is another matter.

To sum up, there has been a steady raising of the standard of precautions in the dangerous trades, and the results are very evident in the statistics. There has been more recently a marked advance in the practices of a number of trades which, whilst not dangerous, have yet peculiar conditions. And there is a growing attention being paid, and a new scientific study being made, of the general conditions of welfare in the ordinary factory. More especially hours of work are much shorter than they were. Credit for the improvements is due partly to factory legislation and its administration, partly to voluntary agencies, and a changing public opinion. The results must be looked for in later years in the general health and mortality figures of different occupations and of the whole nation.

THE BRITISH EMPIRE LEPROSY RELIEF ASSOCIATION.

ON Jan. 31st a meeting was held at the Mansion House to open a campaign on behalf of the 300,000 lepers in the British Empire. The Lord Mayor presided. It is hoped to raise a fund of £250,000 for the purpose, and donations of £100 from the King and £100 from the Prince of Wales were announced. Messages were read from the Prince of Wales and from the Viceroy of India (Lord Reading).

Lord Chelmsford (chairman of the Association) outlined the situation that led up to the formation of the Association and emphasised the Imperial character of the latter. He urged business men to look upon the Association as a piece of health work for the Empire and to accord it the support it deserved.

Sir Humphry Rolleston said that leprosy, now very rarely seen in this country, was therefore apt to be out of mind; but as the greatest colonising Power in the world it was our obvious duty to set an example of preventive medicine. This country was now practically free from the disease, there being only one, a very small, though attractive, leper colony—that of St. Giles, near Chelmsford, which was in urgent need of funds; but it was once a very different story, for in the fifteenth century there were said to be 19,000 leper hospitals in Europe, including 2000 in France and 200 in England, and although many of the inmates were no doubt suffering from diseases erroneously regarded as leprosy, those figures gave some idea of its prevalence.

The Danger of Undetected Cases.

The unfortunate victims of this slow but hitherto remorselessly progressive disease became terribly mutilated and suffered both in body and in mind. In the dark ages they were pariahs; such isolation, no doubt in association with other factors, helped to diminish the spread of the disease, but the unhappy plight of recognised lepers had naturally always made them try to hide their disease. Even now this concealment was one of the great difficulties to be contended with in its prevention; in India, for example, although officially there were 102,000 lepers in 1921, there was reason to believe that there were at least as many more undetected. Leprosy was now known to be contagious and not hereditary, but the disease took years to develop after the seeds had been sown; the young were specially likely to contract it, so that an unrecognised case in a parent might infect the young family. Prevention was better than cure; in order to remove the natural dread of isolation from simple-minded and suspicious natives the conditions of segregation must be rendered attractive instead of repulsive, and leper colonies holding out pleasant, instead of prison-like, conditions of life must be provided. This was already being done in India, but only 8000 of the known 102,000 lepers were at present receiving help in this respect. Segregation alone was not enough to stamp out the disease; to detect the earliest stages and to test out the newest remedies required further research and therefore endowment. It was 50 years since Hansen published his discovery of the leprosy bacillus and this jubilee should surely be celebrated by its final disappearance. How was this to be effected? There appeared to be good reason to believe that Sir Leonard Rogers had found in the fatty acids of certain oils and in the preparation called

morrhuate of sodium a remedy that bade fair to be a real cure. Further work remained to be done; it was not always that the right man and the means for such a success were available, and it was therefore obviously up to them to give him the full opportunity.

Development of the Use of Chaulmoogra Oil.

Sir Leonard Rogers briefly outlined the researches which enabled him to establish the important principle that by the injection of soluble products of the active portions of the old Indian remedy for leprosy, chaulmoogra oil, the bacillus of the disease could be destroyed within the body, with clearing up of all symptoms, as well as of the infectivity of the disease, and that similar preparations derived from cod-liver and other oils were also effective in leprosy. An American chemist in Honolulu later introduced a slightly different and more convenient product of chaulmoogra oil, which had now been used successfully for several years in various countries; the latest report from the Philippines of a trial of these various preparations in 4067 cases showed 56 per cent. improved, and in 36 per cent. more showed arrest of the disease, while where injections had been continued for the necessary periods of 6 to 9 months 74 per cent., and after 12 to 15 months no less than 93 per cent. of cases showed definite improvement, and a number had been completely cleared up. Numerous cures, in the very practical sense of restoration to health and working power, could now be obtained, while as some of his early cases had remained well for from six to eight years, there was good reason to believe that permanent cures could be established, an immense advance having already accrued in the treatment of this hitherto intractable disease.

Confidence of Natives in the Treatment.

To those who had had much experience of medical work in India and other tropical countries, he said, equally conclusive evidence was furnished by the fact that in many places numerous lepers were willingly submitting to weekly injections for many months, although such races would not continue a troublesome treatment unless absolutely convinced of its very beneficial effects. In leprosy, however, as in tubercle, much caution was necessary in speaking of a cure, and relapses had occurred due to not continuing the treatment for some time after the symptoms had disappeared. Nevertheless some of his earlier cases had remained well for six to eight years, so there was good reason to believe that permanent cures could be obtained, although, of course, lost fingers could not be replaced, and there was a definite limit to the efficacy of the treatment in long-standing and advanced cases, although photographs recently received show astonishing improvement even in some of the most advanced nodular cases. Apart altogether from the still incompletely settled question as to what proportion of lepers could be cured, to the important extent of losing all symptoms and infectivity and being restored to health and usefulness, the recent advances were rapidly removing the greatest obstacle to the reduction of leprosy by the segregation methods hitherto almost entirely depended on—namely, the impossibility of finding and isolating lepers in the early stages of their disease, before they had infected other members of their households.

Sir Leonard Rogers considered that from the point of view of the reduction and eventual eradication of leprosy from British possessions, an even more important outcome of the recent advance was already evident—namely, that for the first time in the 3000-year-old history of leprosy, large numbers of lepers were coming forward in the early and more amenable stages of the disease and the clearing up of their symptoms and infectivity was being accomplished in Calcutta in an out-patient clinic at low cost, before they had infected another generation of their households; thus there was a possibility of reducing the prevalence of the disease more rapidly than ever before, if only funds were forthcoming to bring the remedial measures medical science had at length furnished, within the reach of the 300,000 or more lepers in the British Empire, not more than one-fifth of whom could now be receiving the improved treatment, mainly on account of the poverty of India, tropical Africa, and others of our most affected possessions.

The Work of the Association.

The British Empire Leprosy Relief Association would work largely through existing agencies in distributing drugs, information regarding their use and the latest medical advances, by helping sound schemes of segregation combined with the latest treatment, training the staffs of leper institutions, and supporting research for still further improving the treatment, which fails to completely clear up many advanced cases; in short, to coördinate treatment and research throughout our scattered possessions. The recent advances were due to British and American investigators, but at present only the Americans were supplying their blessings to the great majority of their lepers in the United States, Hawaii, and the Philippines. As the 1923 Strasbourg International Leprosy Congress passed a unanimous resolution that all lepers segregated for the benefit of others ought to receive the best possible treatment, a moral obligation lay on Great Britain to fulfil this obviously just and urgent demand.

Mr. Frank Oldrieve (secretary of the Association) said that in India last year he saw more than 1100 lepers under the new treatments for the disease, and the majority were recovering. They might look forward to the Empire being practically free of leprosy within 30 years. Three points were to be stressed: (1) Segregation was effective in reducing the incidence of the disease; (2) leprosy was not hereditary; (3) leprosy was now curable. There was only the present generation of lepers to be dealt with. This was the most hopeful of all campaigns, for they were on sure ground and definitely knew what to do.

Sir Sydney Olivier, in moving a vote of thanks to the Lord Mayor, compared the discovery of the new treatment of leprosy to the establishment of the sources of infection in malaria and yellow fever. As Secretary of State for India he ventured to point out to his Indian friends, who had a large body of very able medical men, that they had an enormous opportunity, which had only recently been opened out to them.

NOTES ON THE FRENCH MILITARY HEALTH SERVICES.

(FROM OUR OWN CORRESPONDENT.)

THE French military health services are passing through a period of crisis which has arisen since the war and is due to the diminution of its personnel. The recruitment of French military doctors has, in the past, been carried out through two channels. (1) The first was the special Army Medical School at Lyons, to which admission was gained on a competitive basis. The course consisted of four years' study, and the same medical programme was followed as for the civil students at the Faculty of Medicine of Lyons, except that military discipline was enforced in the school. On qualifying, graduates were sent to the Val-de-Grâce, Paris, for a year's study of medicine in its application to the military health services. (2) The second channel was direct entry to the Val-de-Grâce by competition, open to doctors who had taken medical degrees elsewhere than at the Lyons School. On entering the army, the military doctor attained the rank and prestige of a combatant officer. Before the war these conditions were eminently satisfactory, competition was keen, and the best type of efficient army doctor was obtained, but at the present time the situation is completely changed. Pay has not risen in proportion to the cost of living, and the course of study required is long and costly. As six years are required in preparation, the army doctor, even if he starts his studies at an early age, cannot hope to commence his career before the age

of 25, while combatant officers from Saint Cyr or other military academies may attain a rank equivalent to his own at 20, after two years of study. And, on the other hand, a comparison with a medical man's prospects in civil life shows that the civil doctor's income at least bears some relation to the fluctuation of prices. The result has been that a considerable number of military doctors have left the service, and fresh recruits are not forthcoming. At a recent competitive examination at Lyons there were only half as many candidates as there were posts to fill. Such has been the experience every year since the war.

The Army Parliamentary Commission, realising the inadequacy of the pre-war system under present conditions, has abandoned the scheme of regimental service whereby one doctor was attached to one unit, and has instituted a medico-chirurgical service for each town, thus placing one medical officer in charge of several units. But it is too much to expect that one army doctor, however conscientious he may be, can alone give wholly adequate attention to several and perhaps widely separated units. Further, the doctor, in collaboration with the regimental commanders, played an indispensable rôle in dealing with all questions of hygiene, and it is now feared that his widened sphere will cause dilution of his influence, and the medical aspect of the army service will be weakened. In a country like ours, where military service is compulsory, everyone should have the right to adequate medical attention while in the army.

To meet the present crisis recourse has been had to civil doctors, who have been offered appointments at the various centres. But that is only a half measure, and cannot be more than temporary. The army needs permanent advisers on all health matters, who by their intimate and specialised knowledge of army conditions can maintain the highest standard of physical efficiency among the troops. In order to attract medical men to the army, and to retain those who are already in service, it has been proposed to add a substantial monthly bonus to the present rates of pay. It is to be hoped that this proposal will be carried into effect as soon as possible, in order to avert any further dissatisfaction.

VIENNA.

(FROM OUR OWN CORRESPONDENT.)

A Surgical Lecture on "Dichotomy."

ONE must go back very far in the history of the medical profession to encounter an incident similar to that which happened a short time ago when Prof. Dr. Hochenegg, the well-known chief of the first surgical clinic of the Vienna University, launched a deliberate attack on the ethical standard of the Vienna doctors. In the course of a lecture, held before his regular audience of students, the professor declared that one of the most important principles of medical art was the correct indication for operations, and he was forced to state that in this respect the medical profession of Vienna was lacking in an unbiased consideration of deciding factors. He possessed proofs, he said, that monetary considerations were of paramount influence in deciding whether surgical interference be advised or carried out in the case of any particular patient. The disgraceful custom of "dichotomy"—splitting the fee between the family practitioner and the consultant or surgeon—had become lately so widespread and so widely accepted that those few upright men who refused to be a party to such proceedings were simply shut out from consultative work, and their practices, like his own, had dwindled away. Consultants who employed "agents" at a commission varying from 30 to 50 per cent. were flourishing and were praised as masters of their profession, while those who would not countenance "dichotomy" were held to be incompetent, antiquated, and incapable of doing any modern surgery. This disgrace Prof. Hochenegg would not tolerate any longer, and as he too had been the victim of rumours of having become quite unfit for surgical work, he exposed the intrigue to his students and also took care to communicate his lecture to the press. Needless to say, when the article appeared in the papers it caused a great outcry both amongst the profession and the general public. The Medical Council and the Economic Organisation both held protest meetings against the insinuations contained in the lecture. The professor was asked to show his proofs, and to state the names of the men who had acted in this shameful manner, otherwise he would be prosecuted for slander. The professor at first refused to hand over the material of his lecture to the authorities, but at last he was forced to give in, and within a fortnight he will have to sustain his attack on the profession with definite figures and names.

The First Year of Cremation in Vienna.

The first report of the Cremation Institute of Vienna was published recently, and it is very interesting to note that in spite of both open and secret opposition it could not only hold its own but even contribute to the finances of the municipality. Whilst at first the Government, whose leader is a Roman Catholic priest, was most violently opposed to the idea and tried to prevent the erection of the institute by every means at its disposal, it now limits its antagonistic attitude to a passive resistance. But the priesthood of both the Catholic and the Jewish creeds are openly hostile still, and refuse the religious ritual at the burial of a cremated body. Nevertheless, in the first month of last year, when the institute was opened, 30 cremations took place, and the number increased monthly until in December it reached the figure of 89. Altogether 834 corpses were cremated (519 males, 315 females). As regards religion, 517 were Catholics, 124 Evangelic, 95 Jewish, and the remainder were undefined. The original calculations were based on an average monthly record of 50 cremations, those actually effected constitute 5 per cent. of all burials in Vienna. If, however, we consider that a large number of burials take place at the expense of the municipality as "poor" burials, we find that nearly 10 per cent. of all burials paid for are cremations. The capital invested in that institute brings an interest at the rate of 25 per cent. per annum.

Medical Certificates of Exemption.

Physicians are often requested by their patients to supply a certificate stating that the patient is unable to attend school or to fulfil certain duties—e.g., as a witness in court, &c. This "desire to be ill" is often so pressing that the doctor complies with the patient's wish and provides a certificate in which the reasons for exemption are very often only an exaggeration of trivial symptoms. In a memorandum to the profession the Medical Council issues a warning to doctors with regard to this practice. The Austrian law does not at present deem such conduct to be illegal, but under the proposed new Medical Act the doctor would incur the danger of being charged with fraud if he were to give a wrong statement "knowingly." If the statement is used to obtain any material advantage—damages for an injury or free treatment under the "War Invalid's Act"—the doctor may be sued for damages by the second party wrongly charged. The minimum danger for the doctor would be of arraignment before the Medical Council for breach of the ethical code.

UNIVERSITY OF MANCHESTER.—A bronze bust of Prof. Harold B. Dixon, who occupied the chair of chemistry at the University from 1886 to 1922, was unveiled on Feb. 1st in the chemical theatre of the University by one of Prof. Dixon's earlier pupils, Dr. Harold G. Colman. Prof. Dixon said that it had been his ambition to complete the work of his predecessors, Frankland and Roscoe, and to secure facilities of research. Thirty-six years ago the facilities for research were practically confined to the big German laboratories. Our industries require recruits with training in methods of research, and the memorial he had striven for was the reputation of the laboratory of the University as a school of research. Individual subscribers to the Dixon memorial number 240, and the sum subscribed was £550, of which about £500 would be available for the bursary which it was proposed to found in honour of Prof. Dixon.

Correspondence.

"Audi alteram partem."

A NEW TECHNIQUE IN RADIUM THERAPY.

To the Editor of THE LANCET.

SIR,—From the nature of the radiations emitted by the later disintegration products of radium it was thought that preparations of these later products alone, and without any of the more active members of the series, might have a specific action on superficial lesions. It has been found possible to prepare quite suitable applicators, and initial clinical experiment has so confirmed the expectation that we desire to make this preliminary notice of the work.

The diseases which have so far been treated with these preparations are: superficial nævus of the telangiectatic type and lupus erythematosus. Within a short time a very definite reaction has resulted with each disease. Part of an extensive superficial nævus showed marked improvement within ten days, with final pallor over the area of application. In a very intractable case of lupus erythematosus the reaction was most pronounced, and an apparently healthy area of natural colour was produced.

The results so far obtained are very encouraging, and work is being continued both on the methods of extraction of the particular active material and on the therapeutic use of such preparations. It is hoped to publish at a later date full details of the processes involved, and of all the clinical results.

We are, Sir, yours faithfully,

W. HERBERT BROWN, M.D.,
Dermatologist to the Victoria Infirmary, Glasgow;
JOHN P. MCHUTCHISON, B.Sc., M.A.,
Physical Chemist to the Glasgow and West of Scotland Radium Committee.
University of Glasgow, Jan. 23rd, 1924.

*** The collection of emanation residues is a matter of no little economic interest.—ED. L.

AIR NAVIGATION AND THE SCOPE OF PREVENTIVE MEDICINE.

To the Editor of THE LANCET.

SIR,—Travel has ever been a potent factor in disease propagation; a perusal of the history of medicine bears graphic witness to this fact. The Black Death which ruthlessly traversed the trade routes of the world in the Middle Ages might well be instanced; or, again, the cholera epidemics of 1817, 1826, and 1891, with India as their starting-point. To cite a recent example, the outbreak of small-pox in London in October, 1923, was traced to a woman traveller from Valencia in southern Spain. These are but isolated examples, chosen from memory and with due regard for brevity. It is of interest to speculate in regard to the spread of disease by air travel, and the measures which might be found necessary for the effective prevention thereof.

Some 20 years ago, the first power-aeroplane was flown for 12 seconds by Wright in America. To-day our aeroplanes have attained a speed of 250 m.p.h., have flown to a height of seven miles, and have remained in the air for a continuous period of 36 hours. Future progress may be as rapid. At the Imperial Conference held in London, October, 1923, the Air Minister stated that in the past three years our cross-channel air service had met with no serious accident, although 2,000,000 miles had been flown. The number of passengers was steadily increasing. Sir Samuel Hoare then proceeded to explain the Burney scheme to the Conference. This scheme proposes the opening up in the near future of an airship service between this country and India. The French Air Ministry has recently promised financial support to the proposed inauguration of an airway between Paris and Buenos Ayres. The International Air Navigation Commission, with headquarters in Paris, is at work preparing schemes, conventions, and maps, in the confident anticipation of the early establishment of these and other great airways.

In connexion with the International Commission a special medical subcommission has been duly set up, to deal presumably with the momentous medical problems which generalised air travel will bring to light. The work of such a subcommission should proceed principally along the channels of preventive medicine, so as to organise a line of defence against importation of disease through the medium of air travel. The vigilance practised by sanitary authorities at our seaports will require to be exercised in even greater degree at the great airports of the future. The danger of the propagation of disease by air travel is real. Cholera, for example, is a disease whose rate of spread coincides faithfully with the speed of human travel. Epidemics of this disease select India as their usual starting-point. Now an airway to India (as outlined in the Burney scheme) would allow of the completion of a journey in five days that now occupies 15 days. Again, travellers by air will complete long journeys within the limits of the incubation periods of certain infectious diseases which at present manifest themselves during the sea-voyage. Disposal of excreta on board airships may present difficulties. In the case of shipping Nature provides an effective means of disposal. In the case of aircraft performing long journeys a conservancy system will have to be devised.

The medical problems arising out of popularised air travel will constitute a new branch of public health work. Work of such a civil air medical service might comprise, inter alia, the medical inspection of all travellers by air on embarkation and disembarkation; the rigorous medical examination of all intending pilots or crew of aircraft; the periodical re-examination of such pilots and crew; the direction of sewage disposal; the periodical fumigation of large aircraft; the maintenance of adequate medical equipment on board aircraft. Many other duties could devolve upon such a service.

I am, Sir, yours faithfully,

ARTHUR MASSEY, M.B., Ch.B., D.P.H.,
Jan. 31st, 1924. Asst. M.O.H., Southampton.

THE "ELECTRONIC REACTIONS" OF ABRAMS (E.R.A.).

To the Editor of THE LANCET.

SIR,—There are at present only a few medical men in London who have faith in the E.R.A., and many others who have followed the articles in the American journals have more than a shade of scepticism.

The able article in THE LANCET of Jan. 26th by Dr. Howard Humphris, and the leading article in the *British Medical Journal* of the same date, have increased the number of sceptics. Everyone would welcome a real test of the diagnostic power of the Abrams machine and its modifications, leaving the question of treatment out of the inquiry, as many conditions are benefited by suggestion, and suggestion acts more powerfully when it is directed by means of some appliance not understood by the patient. The test I would suggest is that three of the exponents of this cult be selected to meet a like number of medical men chosen by yourself. The blood should be taken from each of the three "controls" (or ought I to say mediums?) of the followers of Abrams, and these specimens should be shuffled in with specimens of blood taken from patients with known and well-recognised diseases. These E.R.A. practitioners should report on the series of bloods, not knowing their sources, when, as their "controls" are presumed to be fairly healthy, the results might be interesting.

I am, Sir, yours faithfully,

BRUCE BRUCE-PORTER.
Grosvenor-street, W., Feb. 4th, 1924.

THE EXPLOITATION OF NURSES.

To the Editor of THE LANCET.

SIR,—A protest should be made against an apparent exploitation by the General Nursing Council of the mute, but not inglorious, army of women who are entering the nursing profession. At present a trained nurse has to pay a registration fee of one guinea and an annual half-crown to keep her name on the register. Now, it is proposed to charge impecunious girls a fee of five guineas for the examination which, if they pass, will enable them to be registered. I suppose this fee is to pay the expenses of the examination and the fees of the examiners. It is an extravagant charge and, in my opinion, ought to leave a considerable balance in the hands of the examining body. If so, the council ought to state their object in extracting this surplus money from a hard-worked and underpaid body of women. Is there some project to raise a fund to erect a college of nursing for the accommodation and aggrandisement of this important council? If this be the case, the women who are paying these fees should have some voice in the matter.

Much to the amusement of the medical profession, the council has issued an astounding syllabus of the medical knowledge to be acquired by nurses. It is so extensive that only the most highly intelligent women will be able to acquire more than a smattering of each subject, with the result that the confusion between medical and nursing knowledge will be at a maximum. And, in order to acquire this hotch-potch of knowledge, these girls will have to attend numerous lectures and study during their hours of leisure, although physically fatigued by the nature of their work. Or else the time spent on lectures, &c., will have to be included as part of their day's work, at the expense of the much more valuable practical training. The standard of most of the girls entering the nursing profession is neither socially nor intellectually as high as in former days. In my experience the slight improvement during the last two years is falling off. Consequently these girls are even less likely to absorb the excessive book knowledge which is aimed at. Moreover, it is not knowledge of this sort which produces the most capable nurses. The best ward sisters and nurses are by no means always those who have shone in the examination room.

If this pseudo-scientific examination is conducted so as to maintain a fairly high standard, it means the rejection of a certain number of reasonably capable nurses, possibly 20–30 per cent. Surely, this will prevent girls taking up this profession: three years' training, hard physical and mental work, a minimum salary, and possible rejection at the end. On the other hand, if the standard adopted is that in vogue at the various hospitals, where few fail to reach the standard deemed necessary for practising as a nurse, I see no necessity for a five guinea examination, unless it is a measure for obtaining money from these impecunious girls for some such purpose as above suggested.

Let me propose to the General Nursing Council that this scheme be dropped. It is ridiculous. If they wish to create a more highly qualified type of nurse, let them introduce a voluntary examination and give a special certificate or a diploma of nursing, and allow the rest of the nurses to be examined as at present. This might result in the development of two grades of nurses, one of which would be able to demand and would deserve higher fees, while the other will supply the public with the kind of nurse it often wants. Does the council suppose that raising the standard to an unduly high level is going to provide the type of nurse who will be content to nurse trivial and chronic cases, although these form the bulk of the cases in general practice?

I am, Sir, yours faithfully,

EDMUND CAUTLEY.

Park-street, W., Feb. 1st, 1924.

MEMORIAL TO THE LATE PROF. ASHLEY CUMMINS.

To the Editor of THE LANCET.

SIR,—The many friends and former students of the late Dr. W. Ashley Cummins, professor of the practice of medicine at University College, Cork, will learn with a sense of the keenest satisfaction that a project of providing a permanent tribute to his memory has been initiated.

It is thought that no more fitting memorial could be chosen than the endowment of a bed in the Victoria Hospital, to which Dr. Cummins devoted so much of his professional life. Those who knew Dr. Cummins will realise instinctively that he himself would have wished no other tribute to his memory than that his name should be associated for all time with the beneficent work of the hospital in which he took a keen and life-long interest, and of which his father was one of the founders.

Graduates of University College, Cork, who were associates or pupils of the late Prof. Cummins, and other members of the profession who feel so disposed, are invited to coöperate and to send donations to one of the signatories of this letter.

We are, Sir, yours faithfully,

C. B. PEARSON,
1, Sidney-place, Cork.

MICHAEL CAGNEY,
13, St. Patrick's-place, Cork.

Jan. 29th, 1924.

A CORRECTION.

Re REVIEW OF "EMERGENCY OPERATIONS FOR GENERAL PRACTITIONERS."

To the Editor of THE LANCET.

SIR,—I shall be glad if you will allow me to correct a series of singularly unfortunate errors and inaccuracies which appeared in a so-called "review" in THE LANCET of Jan. 26th regarding a new book of mine, entitled "Emergency Operations for General Practitioners on Land and Sea." After perusal of the somewhat imposing array of these inaccuracies, as enumerated below, I think it will be clear to you and to your readers that no worth can be attached to such a review, and that in fairness to author and publisher alike there should be an open acknowledgment of these incorrect statements:—

1. *The title* is incompletely given. This should have read "Emergency Operations for General Practitioners on *Land and Sea*." The latter part was quite omitted.

2. *The size* of the book was not stated. This should have been given as demy 8vo.

3. The number of printed pages contained in the book was most incorrectly stated as 1065, whereas the actual number is xii.+135.

4. No mention is made regarding one of the chief features of the book—viz., the illustrations, of which there are 67, all original.

5. *The price* of the book is unfortunately as well as incorrectly stated to be 15*s.* instead of 7*s.* 6*d.*

6. Your reviewer has made misleading statements when he says, "Instructions how to find the cæcum in an appendix operation, and where to look for a perforated gastric ulcer, have been omitted." Now no one objects to a fair criticism of a published work, but inaccurate statements call for comment and correction. Had your reviewer made more than a superficial scanning of my book he would have found that the information he declares "missing" appears on pp. 33–34, and 30 respectively.

7. Again, there is an observation regarding strangulated hernia, that certain diagnostic points are absent. Had he carefully perused the preface, he would have noted that it is clearly pointed out that "questions regarding diagnosis are not entered into nor considered in this small volume."

8. Another of your reviewer's inaccuracies appears regarding "Intra-abdominal hæmorrhage." Arrest

of hæmorrhage in general is dealt with on pp. 115–122, whilst hæmorrhage from gastric and duodenal ulcers appears on pp. 29–30. The absence of *rare* operations is beyond criticism, as such absences are alluded to in a general way in the preface.

9. Another incorrect statement is contained in the remarks regarding end-to-end anastomosis, where it is said that "no account of the operation is given." Perhaps your reviewer will note that gastro-intestinal anastomosing and intestinal suturing are not only described, but both are fully illustrated by actual photographs of the procedure, the former on p. 27 and the latter on p. 75.

Bearing in mind, therefore, the complete series of mistakes and incorrect statements, as above shown, it will be fairly obvious that the very dogmatic summing up of the book in question, as is contained in the closing sentence of this review, is as unjust as it is unmerited, and likely to ruin the sale of the book, with consequent loss both to myself and to my publishers.—I am, Sir, yours faithfully,

Newcastle-on-Tyne, Feb. 2nd, 1924. H. C. ORRIN.

*** We regret that in a review of "Emergency Operations for General Practitioners on Land and Sea, An Illustrated Manual of Procedure and Technique," by Mr. H. C. Orrin, surgeon to the Ministry of Pensions Orthopædic Hospital, Newcastle-on-Tyne, the number of pages and price of the book were stated wrongly through confusion with another volume. We have been unable to find in the book a statement of the price. The book contains 135 pages, including index, and is published at 7*s.* 6*d.*, the advertisement which appeared in our issue of Jan. 19th being correct. The book was reviewed under the title "Emergency Operations for General Practitioners," the style which appears on the cover. We have wronged Mr. Orrin, and are happy to say so and to publish his letter. This arrived when THE LANCET was at press, so that no opportunity arose to invite the reviewer to withdraw any statements, or opinions, or to qualify them in this issue. But inspection of the book makes it clear that we are dealing here with differences of opinion and interpretation of words rather than with facts. A suggestion which reaches us, not from Mr. Orrin, must be mentioned to be repudiated. It is that the reviewer has taken cowardly advantage of anonymity. Reviews in THE LANCET are not signed, and the charge of dishonesty must be met by ourselves with a denial.—ED. L.

INSTITUTIONAL MEDICAL OFFICERS AND INCOME-TAX ASSESSMENT.

To the Editor of THE LANCET.

SIR,—The Medical Defence Union has recently obtained from the Special Commissioners of Income Tax a decision which the Council of the Union feels is of such importance as to merit publication in the medical press.

A member of the Medical Defence Union, who was the medical superintendent of one of the Metropolitan Asylums Board's Hospitals, by virtue of his office occupied a separate house in the grounds of the hospital rent free. The local inspector of taxes sought to assess our member upon the rateable value of this house, treating it as an emolument of his office. The Union was accordingly consulted in the matter, and an appeal was lodged against this assessment with the Special Commissioners. The decision of the Commissioners has now been obtained, to the effect that the beneficiary occupation of a house in circumstances such as these is not an emolument within the meaning of the Finance Acts, and the assessment has therefore been discharged.

As there must be many medical men similarly placed, it is felt that the decision thus obtained ought to be made known in their interests.

I am, Sir, yours faithfully,

JAMES NEAL,
General Secretary, Medical Defence Union.

19, Bedford-square, London, W.C. 1, Feb. 5th, 1924.

The Services.

ROYAL NAVAL MEDICAL SERVICE.

C. Godfrey to be Surg. Lt.

ROYAL ARMY MEDICAL CORPS.

The undermentioned retire on ret. pay.

Majs. Robert J. Cahill (granted the rank of Lt.-Col.) and E. C. Whitehead.

The undermentioned Lts. are confirmed in their rank: W. B. F. Orr, F. J. O'Meara, and T. W. Davidson.

ARMY DENTAL CORPS.

Capt. J. C. Wood, late Spec. List., to be Capt.

INDIAN MEDICAL SERVICE.

Lt.-Col. R. A. Needham to be Brevet Colonel.

The King has approved the retirement of Lt.-Cols. P. St. C. More and E. M. Illington.

Mohan Singh Segat, Rajindar Singh Sandhu, and Achanvittil Krishna Menon to be Temp. Lts.

Lt.-Col. G. Tate's tenure of office as an elected member of the Punjab Medical Council expires on Feb. 24th, and the election of his successor is at present under consideration. Col. R. Heard, Inspector-General of Civil Hospitals, and Lt.-Col. W. C. H. Foster, Director of Public Health, have been appointed Members of the Punjab Legislative Council. Maj.-Gen. Benjamin H. Dare has been appointed a member of the Bengal Legislative Council. Col. Hugh Ainsworth has been appointed a Member of the Bihar and Orissa Legislative Council. Lt.-Col. H. G. Hutchinson has been granted eight months' leave.

Medical News.

ROYAL COLLEGE OF PHYSICIANS OF LONDON.—An ordinary Comitia of the College was held on Jan. 31st, the chair being taken by Sir Humphry D. Rolleston, the President.—The following candidates were admitted to the Membership of the College: Drs. C. W. C. Bain, J. Bamforth, V. J. Bonavia, A. J. Cronin, B. Day, R. Hale-White, C. G. Imrie, J. H. Kelly, D. Pottinger, B. H. Spilsbury, A. Stokes, H. M. Turnbull, C. H. Whittle, and B. B. Yodh.—Licences to practise physic were granted to 198 candidates (including 32 women) who have passed the Final Examination in Medicine, Surgery, and Midwifery of the Conjoint Board, and have complied with the by-laws of the College. The following are the names and medical schools of the successful candidates:—

Robert D. Alexander, Cambridge and St. Thomas's; Cyril F. Ashby, St. Bart.'s; Joseph Atkin, Guy's; Naguib Fauzi Azer, Cairo and Charing Cross; Robert C. Baxter, Charing Cross; Harold P. Baylis, Guy's; John Bee, London; Edgar R. Bennion, Westminster; *Muriel E. Binns, Royal Free; Charles E. W. Bower, Manchester; Michael Angelo Boneventure Brito-Mutunayagam, Ceylon and St. Thomas's; William Brockbank, Cambridge and Manchester; Ronald W. Brookfield, Liverpool; Walter G. S. Brown, Cambridge and St. Bart.'s; Richard E. D. Cargill, Oxford and St. Bart.'s; Herbert D. Chalke, Cardiff and St. Bart.'s; James H. H. Chataway, Manitoba and St. Bart.'s; *Nora Cheney, King's College; Richard Chester, Leeds; William Clark, Charing Cross; George D. Clarke, Hyderabad and London; Robert G. Cochrane, Glasgow and St. Bart.'s; Thomas S. Cochrane, St. Bart.'s; Peter S. Connan, King's Coll.; Alexander M. Cooke, Oxford and St. Thomas's; *Rosemary Cooke, Cambridge and Charing Cross; Samuel S. Cruden, St. Bart.'s; Desmond E. Cuffey, Cambridge and King's Coll.; Edward R. Cullinan, St. Bart.'s; *Vera Cullwick, Birmingham; Charles H. C. Dalton, Cambridge and St. Bart.'s; Alfred F. D. Darlington, Cambridge and St. Thomas's; Arthur B. Davies, Guy's; John H. T. Davies and Phillip O. Davies, Cambridge and St. Bart.'s; Trevor Davies, St. Bart.'s; *Dorothy L. C. Day, London; Arthur M. Deane, St. Thomas's; John S. Dees, Bombay and Middlesex; Alexander de Souza, Cambridge and Middlesex; *Miriam P. de Villiers, Cape and Royal Free; George P. Driver, Manchester and St. Bart.'s; Wilfrid H. Dunn, St. Thomas's; *Winifred P. Edmunds, King's Coll.; *Barbara J. Edwards, Birmingham; John Elgood and Gilbert Elliot, St. Bart.'s; Vernon H. Ellis, London; Alfred C. M. Elman and Edwin S. Etheridge, Univ. Coll.; Daniel M. B. Evans, Cardiff and Charing Cross; Thomas J. Evans, Cardiff and Middlesex; Edward K. A. Firth, Edinburgh and St. Thomas's; Hubert H. Fisher, St. Bart.'s; Theodore F. Fox, Cambridge and London; Edgar S. Frischmann, Manchester; Maurice W. M. Gadrat, Paris; Philip Garson, St. Bart.'s; William H. George, Cardiff and London; Herbert M. Golding, Bristol; Horace P. Goldsmith, Univ. Coll.;

Wilfrid Gough and Frank E. Gould, Birmingham; Arthur W. Grace, Univ. Coll.; Hellmuth Graf, Liverpool; Francis H. K. Green, St. Bart.'s; Charles W. Greenway, Guy's; Robert J. Gregory, St. George's; Walter E. Grice, Middlesex; Arthur B. Griffiths, Liverpool; Griffith J. Griffiths, Middlesex; Reginald D. Gross, Guy's; Stanley A. Gunter, St. Bart.'s; John A. E. M. Hadley and Leslie W. Hale, Univ. Coll.; Charles S. Hallpike, Guy's; John G. Hamilton, London; Ivor E. Harries, Guy's; Kenneth E. Harris, Cambridge and Univ. Coll.; Arnold W. Hart-Perry St. Bart.'s; Rowland C. Hatcher, Bristol; *Leila M. Hawksley, Royal Free; Linley I. Henzell, Univ. Coll.; James C. W. Hewetson, Guy's; Ernest W. Hicks, St. Thomas's; Henry A. Hirst, London; James A. Hislop, Durham; Stanley A. Holford, Middlesex; John Holmes, Cambridge and St. Bart.'s; Arnold Hooper, Leeds; *Gwynedd Hugh-Jones and *Kathleen M. Hyslop, Royal Free; *Ethel J. Isaacs, Westminster; Harry Jaffe, Manchester; Thomas G. I. James, Cardiff; John W. W. Jepps, Cambridge and St. George's; Alan T. Jones, Cardiff and Univ. Coll.; William Jones, Univ. Coll.; Patrick C. Joscelyne, Bristol; Abdelaziz Abul Khair, St. Bart.'s; Edgar F. King, Bristol; Stanley W. M. King, Sydney and St. Bart.'s; *Charlotte A. Kingdon, Royal Free and St. Mary's; Frank Langford, Bristol; Arthur L. Lankester, Cambridge and St. Thomas's; Noel E. Laurence, St. Bart.'s; David E. Lawrence, Cardiff and St. Bart.'s; Harold B. L. Levy, Durham; *Geraldine N. Longford, St. Mary's; Gordon Lucas, London; *Kathleen M. Lyons, Univ. Coll.; Robert R. Macintosh and Norman W. MacKeith, Guy's; John R. A. Madgwick, London; *Doris I. Mart, Univ. Coll.; *Lucy M. T. Masterman, Royal Free and St. Mary's; Mendel Meyers, Cape and St. Bart.'s; Henry S. Morley, Univ. Coll.; Samuel W. H. Moul, Calcutta and Charing Cross; Raymond T. Mummery, Cambridge and St. Mary's; Carriappa Appayya Nadicarianda, Bombay and London; Bhagwant Singh Nat, St. Andrews; Eric E. Neser, Cape and Guy's; John W. Newbold, Bombay and Univ. Coll.; Isaac Newton, Charing Cross; Charles P. O'Brien, Bombay and St. Bart.'s; Frederick W. Oldershaw, London; Robert D. Owen, Cardiff and Guy's; Robert Owen-Jones, Middlesex; *Lucy Parker, Royal Free; Griffith W. Y. Parry, Cardiff and Guy's; Thomas G. W. Parry and William F. Payne, Guy's; Philip R. Peacock, Middlesex; *Betsey Porter, Liverpool and Royal Free; *Louisa M. Poynder, Bombay and Charing Cross; Trevor M. Preece, Cambridge and St. Bart.'s; Eric A. B. Pritchard, Cambridge and Univ. Coll.; *Evelyn R. Pyke and Alfred J. Reed, London; *Laura M. Rhodes, Royal Free and St. Mary's; Richard L. Rhodes, Cambridge and St. Bart.'s; Oliver F. W. Robinson, Belfast and King's Coll.; Morris Rockfelt, Univ. Coll.; Ernest J. H. Roth, St. Bart.'s; Stanley C. Rowbotham and Max Rubinstein, Guy's; Edgar Rudge, Cambridge and St. Bart.'s; Robert W. Savage, St. Bart.'s; *Margaret B. Savory, Univ. Coll.; Robert W. Scarff, Middlesex; Francis L. Scott, King's Coll.; Eric C. Seward, Guy's; Christopher J. L. Sharp, Cambridge and London; Hubert Sheard, Leeds; Julius Silver, Middlesex; Francis A. H. Simmonds, Cambridge and St. Bart.'s; Alan S. Simpson and Arthur E. Slinger, King's Coll.; Gerald F. Smith, Middlesex; Nathan Smith, Cape and St. Bart.'s; James A. Smortitt, Leeds; *Beatrice M. Smyth, Cambridge and London; Samuel Snelson, Manchester; Walter R. Spurrell, Guy's; Reginald H. Stanbridge, London; Richard S. Starkey, Cambridge and St. Thomas's; Eric G. Steeler, St. George's; William Stephenson, Durham; Joseph D. M. Stewart, Cambridge and St. Bart.'s; *Viva Eileen K. Stuart, Royal Free and St. Mary's; *Edith C. Summerskill, Charing Cross; Harish Chandar Suri, London; Hugh H. D. Sutherland, St. Bart.'s; Thomas R. Sutherland, Cambridge and St. Bart.'s; *Annie D. Symons, Royal Free; Alan K. Thomas, Univ. Coll.; William E. C. Thomas, Cardiff; Kenneth W. Thorp, Cambridge and St. Thomas's; Robert W. H. Tincker, St. Bart.'s; Horace S. Townsend, King's Coll.; Bernard D. Underwood, London; Hubert C. Van Dort, Ceylon and Middlesex; Douglas C. Vaughan, Manchester; Harold F. Walker, Middlesex; Sidney A. Walker, Liverpool; *Dorothy A. Waterfield, London; Edmund R. Weaver-Adams, Cambridge and St. Thomas's; *Elizabeth N. Wells, Charing Cross; Henry J. W. J. Westlake, Guy's; Henry A. M. Whitby and Harold B. White, St. Bart.'s; *Fanny M. Whittaker, Charing Cross; George William Wigg, Durham; *Cicely F. Wilson, Bristol; Albert W. Wood, Birmingham; *Constance A. P. Wood, King's Coll.; and Stanley C. H. Worseldine, Guy's.

* Under the Medical Act, 1876.

Diplomas in the undermentioned subjects were granted, jointly with the Royal College of Surgeons of England, to the following candidates:—

DIPLOMA IN PUBLIC HEALTH.

Ephraim Benjamin, Bombay and King's Coll.; Florence Bentham, St. Mary's and King's Coll.; Mohan Lal Bery, Manchester; Frederick J. Darbyshire, Westminster and Roy. Inst. Public Health; May C. Ferguson, N.U.I. Dublin and Roy. Inst. Public Health; Jitendra Mohan Ghosh, Calcutta and Univ. Coll.; Madhao Ramrao Goverdhan, Bombay and Roy. Inst. Public Health; Eleanor Harse, Royal Free and Univ. Coll.; Ernest C. Holtom, R.N. Haslar and Univ. Coll.; Ivor Lewis, Univ. Coll.; Reginald C. Lightwood, King's Coll.; William S. McGillivray, Aberdeen and Univ. Coll.; Robert H. Parry, Middlesex; Hubert C. G. Pedler, Univ. Coll.; Mangalam Kesavavaliathan Gopala Pillai, London and Roy. Inst. Public Health; Ruth W. Plimsoll, Royal Free, St. Mary's, and Univ. Coll.; John Reid, Cork and Roy. Inst. Public Health; Percy M. Rivaz, Durham and Roy. Inst. Public Health; Campbell Ross, Glasgow; Effie F. A. Sanuter, Manchester and Univ. Coll.; Narinjan Singh Sethi, Punjab and Univ. Coll.; Robert W. G. Stewart, Belfast and Naval Med. School, Greenwich; Maurice L. Sutcliffe, Univ. Coll.; Ian S. Thomson, Aberdeen and Roy. Inst. Public Health; Joseph R. Tibbles, Aberdeen, Univ. Coll., and London; Joseph Whitby, Middlesex and Roy. Inst. Public Health; and Samuel A. Withers, Univ. Coll.

DIPLOMA IN TROPICAL MEDICINE AND HYGIENE.

Yousif Abul-Nasr Barrada, Cairo; Phanindra Nath Basu, Calcutta; Madan Gopal Bhandari, Punjab; Hari Das, Univ. Coll.; William K. Dunscombe, Durham; Arthur A. Hearne, Aberdeen; Harrie B. Lee, Melbourne; George R. McRobert, Aberdeen; Percy S. Mills, Guy's; William L. Paterson, Glasgow; Percy S. Selwyn-Clarke, St. Bart.'s; Tinnevelly Subbiar Tirumurti, Madras; Hyla S. Watters, Cornell; Clifford L. Wilmoth, Chicago; and Arthur D. Wright, St. Mary's. (All the above were students at the London School of Tropical Medicine.)

DIPLOMA IN PSYCHOLOGICAL MEDICINE.

Douglas R. Alexander, St. Mary's and Bexley; Francis G. L. Barnes, St. Bart.'s and Colney Hatch; James D. Dyson, Middlesex and Maudsley; Alan F. Grimbly, Dublin and Colchester; Henry D. Hayes, Edinburgh and Bexley; William J. Lascelles, Belfast and Hanwell; Douglas B. M. Lothian, Edinburgh and Banstead; Ernest E. Pittman, Sydney and Bethlem; and Jyotirmay Roy, Calcutta and Bethlem.

DIPLOMA IN OPHTHALMIC MEDICINE AND SURGERY.

William E. Jennings, Edinburgh and Ind. Med. Service; Alexander E. MacDonald, Toronto and Roy. London Ophth. Hosp.; Reginald V. Martin, St. Mary's and Roy. London Ophth. Hosp.; Wazir Chand Mathur, Punjab and Roy. London Ophth. Hosp.; John K. Raymond, Edinburgh and Roy. London Ophth. Hosp.; Archibald A. B. Scott, St. Andrews and Roy. West. Ophth. Hosp.; Tarachand Dayasing Shahani, Bombay, Oxford, and Roy. London Ophth. Hosp.; Philip L. Stallard, St. Thomas's, Oxford, and Royal London Ophth. Hosp.; Lance H. Stanton-Cook, Sydney and Roy. London Ophth. Hosp.; Evan K. R. Thomas, Edinburgh and Birmingham and Mid. Eye Hosp.; Victor G. Walker, Trin. Coll., Dublin, and Roy. London Ophth. Hosp.; and Gladys M. R. Webster, Roy. Free and Cent. London Ophth. Hosp.

DIPLOMA IN LARYNGOLOGY AND OTOLOGY.

James B. Horgan, Cork and Golden Square; and William Wilson, Belfast and King's Coll. Hosp.

Sir Charles Sherrington was elected councillor for one year, vice Dr. Buzzard, now Censor. Drs. Drysdale, Poynton, Abram, and T. Wardrop Griffith were also elected councillors in place of Drs. Beddard, A. J. Hall, J. W. Russell, and Gowland Hopkins, who retire by rotation.—Sir Dyce Duckworth was reappointed representative of the Court of Governors of the University of Liverpool; Dr. Voelcker was reappointed on the Court of Governors of the University of Birmingham. Sir William Hale-White was reappointed representative on the Central Council for District Nursing in London. Sir Francis Champneys was appointed representative on the Central Midwives Board.—The President announced that the Council had appointed Dr. A. S. MacNalty to be Milroy Lecturer in 1925.—A proposed lecture on angina pectoris by Prof. Wenckebach, of Vienna, was approved.—A letter was read from Dr. J. A. Hayward, asking that the membership may be restored to him.—The Senior Censor gave notice that at a future meeting of the College he will move "That by-law 194 be amended so as to make women eligible for the Fellowship."—Reports were received from the Committee of Management as follows, and the recommendations made in them were adopted.

The Committee of Management recommend: (1) Addition of the East Suffolk and Ipswich Hospital to the list of hospitals recognised by the Examining Board in England; (2) addition of the Detroit College of Medicine and Surgery, Detroit, Michigan, U.S.A., to the list of institutions whose graduates in medicine are admissible to the Final Examination of the Examining Board in England under the conditions of Paragraph IV., Section III., of the Regulations.

The Committee had considered an application from a Diplomate in Public Health of the Royal Colleges for a certificate that he had obtained the diploma, his original diploma having been lost. There is no authority at present for issuing a certificate of a diploma granted jointly by the two Royal Colleges; in view of the number of such diplomas, the Committee think it desirable to make provision for issuing a certificate of a diploma; the Committee of Management therefore recommended that on receipt of a statutory declaration made by the applicant, setting forth the manner and date of the loss of the diploma, the secretary of the Conjoint Examining Board in England be authorised to issue a certificate stating that the diploma had been granted to the applicant and the date on which it was issued.

The Committee of Management had recently received applications for admission to the Final Examination from graduates of medicine of Russian universities, under the conditions of Paragraph IV., Section III., of the Regulations. In cases where the course of study and the examinations were completed before the year 1916 these applications were

granted. As the Committee are not satisfied that, under present conditions, the standard of medical education and examination on which the Russian universities were formerly recognised, is maintained, they recommended the Royal Colleges to remove the Russian universities from the list of institutions recognised by the Examining Board in England. The Committee recommended that the College of Medical Evangelists, Loma Linda, California, U.S.A., be added to the list of institutions whose graduates in medicine are admissible to the Final Examination of the Examining Board in England under the conditions of Paragraph III., Section III., of the Regulations.

After reports of some Committees had been received, and other formal College business transacted, the President dissolved the Comitia.

ROYAL COLLEGE OF PHYSICIANS OF EDINBURGH, ROYAL COLLEGE OF SURGEONS OF EDINBURGH, AND ROYAL FACULTY OF PHYSICIANS AND SURGEONS OF GLASGOW.—The following candidates have passed the Triple Qualification Examination :—

FINAL EXAMINATION.

Matthew Burn, Charles A. Murray, Leonard A. Watson, Richard F. Kerr, Alexander J. M. Findlater, Jitendranath Dey, Oswald L. Shearer, Donald Jack, Claude A. Parry, Wilhelmina Cochrane Storrie, Patel Shankerlal Hathibhai Masters, Akinlawon Adefolu, Hariprasanna Sen, David K. Fisher, Arnold Raff, Arthur W. H. Noble, Elizabeth Clark, Raymond L. A. Kitchen, Ivo E. Meier, Jacob S. Liptz, Isaac Goldberg, Joseph McAuley, William Melrose, and Clement A. Barrow.

Medicine.—William D. Howat, Annie H. Sutherland, John C. Colvin, Harry Myers, Matthew Clouts, Morris Kelman, Alexander S. Ballantine, Sam Noll, Sudhindra Nath Bandyapadhay, Israel Rostowsky, James Courtney, James H. MacAlpine, and Robert D. Scorgie.

Surgery.—Oliver H. D. Oliver, Frederick W. Robinson, Patrick Murray, James H. MacAlpine, and John Paterson.

Midwifery.—Joseph F. Sweeney, William D. Howat, John C. Colvin, Douglas D. O. McLoughlin, Harry Myers, Matthew Clouts, Morris Kelman, Sam Noll, and Robert D. Scorgie.

Medical Jurisprudence.—Robert H. McKinnon, John J. McKenna, Trevor Hughes, Petrus Johannes Badenhorst, David D. H. Craig, Eleanor P. Topping, Isaac Joels, Daniel T. Gemmell, John J. MacKenzie, Matthew L. Hendrie, Lewis Mackenzie, David S. Middleton, and Adam S. Gordon.

UNIVERSITY OF LONDON.—A meeting of the Senate was held on Jan. 30th, the Vice-Chancellor, Mr. H. J. Waring, being in the chair. The following appointments were made :—Sir Sydney Russell-Wells, M.P., member of the General Medical Council; Dr. R. A. Lyster, representative at the thirty-fifth congress of the Royal Sanitary Institute to be held at Liverpool in July next; Prof. H. R. Kenwood, representative (in respect of University College) at the above Congress.

A course of seven free public lectures on the current work of the Biometric and Eugenics Laboratories will be held at University College, Gower-street, W.C., on Wednesdays at 6 P.M., from Feb. 13th to March 26th inclusive. Among the subjects dealt with will be the "Biometric Study of Cancer," by Dr. M. Greenwood; "Inheritance in Finger Prints and the Possibility of their Use in Cases of Disputed Paternity," by Miss Ethel M. Elderton; and the "Contributions of Sir Francis Galton to Photography," by Prof. Karl Pearson.

TUBERCULOSIS SOCIETY.—An ordinary meeting of this Society will be held at the Margaret-street Hospital, Margaret-street, W., on Friday, Feb. 15th, at 8 P.M., when Dr. Clive Riviere will read a paper on Artificial Pneumothorax as I See it To-day. The annual provincial meeting of the Society will be held at Cambridge on Thursday, Friday, and Saturday, April 10th, 11th, and 12th.

HARVEIAN SOCIETY OF LONDON.—At the annual meeting of this Society, held on Jan. 16th at 11, Chandos-street, the following were elected officers of the Society for the year 1924 :—President: Dr. Reginald Dudfield. Vice-Presidents: Mr. D. C. L. Fitzwilliams, Dr. Montague Smith, Dr. W. E. Falconar, and Dr. C. M. Wilson. Treasurer: Dr. G. de Bec Turtle. Hon. Secretaries: Dr. Alfred Hope-Gosse and Dr. W. G. Bendle. Council: Dr. Edwin Ash, Mr. Gordon Bryan, Dr. Charles Buttar, Sir Crisp English, Mr. G. A. Ewart, Dr. W. Jagger, Dr. A. Langwill, Mr. C. A. Pannett, Dr. K. Playfair, Dr. E. F. Pratt, Dr. Herbert Tanner, and Dr. O. S. Thompson.

CONFERENCE ON MARITIME QUARANTINE.—Dr. Belisario Porras, President of the Republic of Panama, has called a conference to meet in Panama from Feb. 25th–29th to consider the international standardisation of maritime quarantine on the west coast of South America and the prevention of international spread of communicable disease along that littoral. The Secretary-General of the conference is Surgeon William Colby Rucker, U.S. P.H.S., Chief Quarantine Officer of the Canal.

The Right Hon. John Wheatley, M.P., Minister of Health, has appointed Dr. L. Haden Guest, M.P., to be his Parliamentary Private Secretary (unpaid).

WEST KENT MEDICO-CHIRURGICAL SOCIETY.—At a meeting to be held at the Miller General Hospital, Greenwich, to-night (Friday), at 8.45 P.M., Dr. E. G. Annis in the chair, a paper on Experimental Work on the Internal Secretion of the Testis, and Rejuvenation Operations will be read by Mr. Kenneth M. Walker.

MEDICO-PSYCHOLOGICAL ASSOCIATION OF GREAT BRITAIN AND IRELAND.—The next quarterly meeting of the Association will take place on Thursday, Feb. 21st, at 11, Chandos-street, Cavendish-square, W.1, under the presidency of Lieut.-Col. E. Goodall, M.D., at 2.45 P.M., when a paper entitled Twenty-eight Years' Lunacy Experience in Egypt will be read by Dr. John Warnock.

ASSOCIATION FOR THE PREVENTION AND RELIEF OF HEART DISEASE, NEW YORK.—At the annual meeting held in January the following Board of Governors was elected for a term of five years :—Dr. Nathan E. Brill, Dr. Lewis A. Conner, Dr. B. S. Oppenheimer, Mr. Vernon Munroe, and Mrs. A. F. Tiffany. The Governors proceeded to elect the following officers for the coming year :—Dr. Haven Emerson, President; Dr. Robert H. Halsey, Vice-President; Dr. William St. Lawrence, Secretary; and Mr. Edwin O. Holter, Treasurer.

THE BRITISH ASSOCIATION: ANNUAL MEETING IN TORONTO.—The preliminary programme of the annual meeting of the British Association in 1924, to be held in Toronto, Ontario, on August 6th to 13th, under the presidency of Sir David Bruce, has just been issued. The Association will meet in 13 sections. In the section of anthropology, Mr. E. N. Fallaize, Vinchelez, Chase Court-gardens, Enfield, Middlesex, is recorder; for physiology, Prof. C. Lovatt Evans, Physiological Laboratory, St. Bartholomew's Medical College, London, E.C. 1; and for psychology, Dr. Ll. Wynn Jones, 7, St. Mary's-avenue, Harrogate. The inaugural general meeting will be held on Wednesday, August 6th, in the Convocation Hall of the University.

THE LATE DR. A. H. COOK.—Dr. Augustus Henry Cook, who died at his residence at Hampstead on Feb. 1st, was the son of William Henry Cook, M.D., of Edinburgh. He was born in 1857, and was educated at Highgate Grammar School. After studying medicine at University College, London, he qualified L.S.A. and M.R.C.S. Eng. in 1881, obtained the L.R.C.P. Lond. the following year, and gained the M.B. Lond. in 1885. He became senior surgeon and senior anæsthetist to the Hampstead General Hospital, with which his association dated almost from its foundation. He held appointments as anæsthetist to the Hampstead Military Hospital, and as surgeon to the Rosslyn Lodge Auxiliary Military Hospital. He was medical officer to the Infants' Hospital, Hampstead, and clinical assistant in the Soho-square Women's Hospital. Dr. Cook was the author of four volumes of poetry—"The Sirens," "Rizpah," "Psyche," and "Eve Repentant." His contributions to medical literature included articles on typhus complicated with ulcerative endocarditis and cerebro-spinal fever due to pneumococcus.

MANCHESTER ROYAL INFIRMARY.—The report for 1923 states that the annual subscriptions show a substantial increase since 1922, and though through trade depression £584 of subscriptions had been withheld, there was to be set against this temporary loss a net permanent gain of £1618 in view of increased subscriptions. Donations were not up to the 1922 level, but patients' contributions were better than in previous year. The ordinary income of the infirmary and the Barnes Convalescent Home was £85,539, and the total ordinary expenditure was £108,894. The sum of £500 was spent on insulin, "from which markedly beneficial results had been obtained."

MOORFIELDS X RAY DEPARTMENT.—An appeal is being made by the Moorfields Eye Hospital for the sum of £700 to equip the X ray department with modern apparatus. At present the only apparatus in the X ray department which is in good condition is that invented by the late Sir James Mackenzie Davidson for localising foreign bodies in the eye. The committee consider the occasion is specially appropriate for commemorating the valuable services rendered to the hospital by Sir James Mackenzie Davidson, and in appealing for special donations for the X ray department they feel confident that the friends of the hospital will make a generous response. Contributions may be addressed to Secretary Superintendent, Moorfields Eye Hospital, City-road, E.C. 1.

THE LATE DR. T. B. SCOTT.—Dr. Thomas Bodley Scott, Mayor of Bournemouth, died on Feb. 2nd, aged 72. The son of a Brighton surgeon and a descendant of the founder of the Bodleian at Oxford, he received his early education at Brighton College, whence he proceeded to St. Bartholomew's Hospital to study medicine. Having graduated M.R.C.S. Eng. in 1874 and L.R.C.P. Edin. in the following year, he held an appointment for a time as house physician at St. Bartholomew's. About 1876 he took up general practice in Bournemouth, and soon won a position of esteem among his fellow townsmen. In 1921 he entered the borough council, and he died during his term of office as mayor. Dr. Scott latterly published several books of general as well as professional interest, such as "The Religion of a Doctor," "Why Do We Die?" "The Road to a Healthy Old Age," "Modern Medicine and Some Modern Remedies," and "Endocrine Therapeutics." He wrote with charm and with personal conviction, giving a message of hope for those past middle age who were beginning to feel the burden of the years. He was one of the first advocates in this country of the use of thyroid extract in threatening eclampsia, and of the value of anterior pituitary in high tension. In all his writings he brought to bear a wide and personal experience, so that the reader could feel he was on sure ground. Of his contributions to medical journals, an article on Vaccine Treatment appeared in THE LANCET, vol. ii., 1912.

With the death of Dr. Scott another living link with Robert Louis Stevenson has been snapped, for Dr. Scott was Stevenson's medical attendant and intimate friend between 1884 and 1887 when Stevenson was living in Bournemouth. When "Underwoods" was published it was dedicated to several of Stevenson's doctors, but especially to Dr. Scott. Of him Stevenson wrote: "But one name I have kept on purpose to the last because it is a household word with me, and because, if I had not received favours from so many hands and in so many quarters of the world, it should have stood alone—that of my friend, Thomas Bodley Scott, of Bournemouth." He married Adeline, daughter of Albert Savory, Potters Park, Chertsey, and had eight sons and two daughters.

VISITING ASSOCIATION OF THROAT AND EAR SURGEONS OF GREAT BRITAIN.—This Association has been formed in order to enable members of the specialty from different parts of the country to visit home and foreign clinics. It is intended to pay a short visit to a home clinic once a year, and another somewhat longer one to a foreign clinic. As the chief purpose is to study operative technique, the membership must necessarily be limited to a number who can watch an operation at one time in reasonable comfort. The first meeting of the Association was held in Edinburgh on Jan. 25th and 26th, when the morning of the first day was spent in watching the work in the throat clinic. Dr. J. S. Fraser performed two radical mastoid operations with skin grafting. Mr. J. D. Lithgow demonstrated the induction of fibrosis in the inferior turbinals by injection of carbolic in glycerine. Dr. W. T. Gardiner performed Sluder's ethmoidal operation, and Dr. G. Ewart Martin performed endoscopy, including aspiration and lavage of a bronchiectatic cavity. The afternoon was occupied in listening to the pathological demonstrations of Drs. A. Logan Turner and F. E. Reynolds (with lantern) on the intracranial complications of accessory sinus suppuration, and to Dr. Fraser on some points in the pathology of the inner ear. On the morning of the second day the members were able to watch Sir Harold Stiles, F.R.S., perform an operation of interest alike to the general and to the throat surgeon. He first operated upon a pharyngeal pouch, which by its smallness rendered the operation more difficult; he then removed from the neck a very large mass of tuberculous cervical glands in which abscess formation had occurred. After this a clinical demonstration was given by Dr. Douglas Guthrie, at the Royal Hospital for Sick Children. Sir William Milligan is president of the Association, the joint hon. secretaries being Mr. T. B. Layton, 10, Welbeck-street, London, W. 1, and Mr. Musgrave Woodman, 22, Newhall-street, Birmingham.

DONATIONS AND BEQUESTS.—The Royal Manchester Children's Hospital during the past month received subscriptions and donations amounting to £6521, including donations from His Majesty the King, part profits on the sale of Their Majesties' "Empire Day Message," the Lord Mayor of Manchester's Two Million Shilling Fund, £5000; Booth Charities, £250; Dickenson Charity, £150.—Hon. Louisa Henrietta Rennell, of Eaton-place, S.W., left £500 each to the Hospital for Consumption, Brompton, and the Hospital for Incurables, Putney; £1000 each to the Hospital for Seamen, Greenwich, and the British Hospital for Mothers and Babies, Woolwich; and £100 to the Earlswood Asylum for Idiots.—Mr. Alfred Charles Latter, of Sevenoaks, Kent, left £500 to the Eltham and Mottingham Cottage Hospital.—Miss Dora Twyford, of Whitmore Hall, Staffordshire, left £12,000 to the North Staffordshire Infirmary for the erection of a permanent annexe in memory of her father and mother, and £1000 for the general funds of the infirmary. She also left £12,000 to the Hanley Infants Welfare Society.—Mr. John B. Don, of Maulesden, has given £500 to the Forfar Infirmary towards the cost of a new surgical table and X ray apparatus.—By the will of the late Mr. Lewis Midgley, of Harrogate and Manchester, the testator left among other bequests £652 10s. to the Bradford Infirmary; £100 to the Bradford and District Nursing Association; £200 to the Harrogate Infirmary; and £500 to the Manchester Royal Infirmary.—The late Mr. David Politi, of Stoke Newington, N., left by will £500 to the Metropolitan Hospital for endowing a bed in the names of his late wife and himself; £100 to the Children's Hospital, Hackney; £100 to the Jewish Home for Incurables at Tottenham; and £100 to the Jewish Hospital, London.

MEMORIAL TO SIR FRANCIS FARMER.—The death of Sir Francis Farmer, the well-known dental surgeon, on Dec. 24th, 1922, was followed by letters in the press, in which a hope was expressed that a memorial to him and his work would be dedicated at the London Hospital. In November last a few friends decided to circularise by letter a number of those who were known to have been acquainted with Sir Francis Farmer. The letter stated that the proposed memorial was to be partly in the form of a mural tablet in the Dental School of the London Hospital, and partly in the form of an endowment of a scholarship or prize to be associated with his name. There was a wide response to the letter, but there are, no doubt, others, with whom the committee have been unable to communicate, who would like to be associated with the memorial. The committee wish it to be known that the fund is still open, and that subscriptions may be sent to either of the hon. treasurers, Mrs. M. L. Hodges, The Woodlands, Isleworth, or to Sir Herbert Ellissen, 24, Ulster-place, Regent's Park, N.W. 1.

POST-GRADUATE STUDY IN BONN.—A post-graduate course in X ray therapy and X ray diagnosis will take place at Bonn, Rhineland, Germany, from Feb. 24th to March 1st. The lectures will be under the following headings: (1) X ray burns and how to prevent them, by Prof. P. Krause; (2) X ray therapy in gynæcology, by Prof. O. von Franque and Prof. H. Martius; (3) X ray therapy in skin diseases, by Prof. E. Hoffmann and Dr. Schreus; (4) The physics of X rays, by Prof. L. Grebe; (5) The effect of X rays on plants, by Prof. M. Koernicke; (6) The changes produced by therapeutic irradiations from the point of view of the anatomical pathologist, by Prof. Prym; (7) X ray diagnosis in surgery, by Dr. Naegeli; (8) X ray therapy and diagnosis of internal diseases, by Dr. Kading. Medical men who wish to take part in this course of lectures should apply to Prof. Martius, Universitäts-Frauenklinik, Theaterstrasse 5. A registration fee of 5 gold marks is charged to cover the running expenses.

Medical Diary.

Information to be included in this column should reach us in proper form on Tuesday, and cannot appear if it reaches us later than the first post on Wednesday morning.

SOCIETIES.

ROYAL SOCIETY OF MEDICINE, 1, Wimpole-street, W.

MEETINGS OF SECTIONS.

Monday, Feb. 11th.

WAR: at 5 P.M.
Paper:
Surg.-Comdr. R. J. G. Parnell, R.N.: Bismuth in the Treatment of Syphilis.
To be followed by a discussion.

Tuesday, Feb. 12th.

THERAPEUTICS AND PHARMACOLOGY: at 4.30 P.M.
Papers:
Mr. J. B. S. Haldane: Experimental and Therapeutic Alterations of Human Tissue Akalinity.
Dr. E. P. Poulton: Anuria in Hypoglycæmic Coma.

PSYCHIATRY: at 8.30 P.M.
Paper:
Dr. Crichton Miller: The Physical Basis of Emotional Disorder.

Wednesday, Feb. 13th.

SURGERY: SUB-SECTION OF PROCTOLOGY: at 5.30 P.M.
Cases and Specimens will be shown by Sir Charles Gordon-Watson, Mr. Gabriel, Mr. Graeme Anderson, and others.

Thursday, Feb. 14th.

NEUROLOGY: at 8.30 P.M.
Paper:
Dr. C. P. Symonds: Spontaneous Subarachnoid Hæmorrhage.

Friday, Feb. 15th.

ELECTRO-THERAPEUTICS: at 8.30 P.M.

Paper:
Dr. E. W. Twining and Dr. R. Williamson: Gas Replacement in the Treatment of Pleural Effusions.

ROYAL INSTITUTION OF GREAT BRITAIN, 21, Albemarle-street, W. 1.

TUESDAY, Feb. 12th.—5.15 P.M., Joseph Barcroft, F.R.S.: The Respiratory Pigments in Animal Life and Their Significance (Lecture I.).

MEDICAL SOCIETY OF LONDON, 11, Chandos-street, Cavendish-square, W.

MONDAY, Feb. 11th.—8.30 P.M., Discussion on the General Symptoms and Remote Manifestations of Common Affections of the Naso-pharynx, Accessory Sinuses, and Throat. To be introduced by Mr. Herbert Tilley, followed by Lord Dawson, Dr. John Poynton, Mr. W. M. Mollison, Dr. E. M. Callender, Sir Thomas Horder, Mr. C. W. M. Hope, Mr. E. D. D. Davis, and others.

HUNTERIAN SOCIETY.

TUESDAY, Feb. 12th.—Annual Dinner at the Langham Hotel.

LECTURES, ADDRESSES, DEMONSTRATIONS, &c.

ROYAL COLLEGE OF SURGEONS OF ENGLAND, Lincoln's Inn-fields, W.C.

MONDAY, Feb. 11th.—5 P.M., Prof. W. Sampson Handley: General Peritonitis.

WEDNESDAY.—5 P.M., Prof. R. Lawford Knaggs: Osteogenesis Imperfecta.

FRIDAY.—5 P.M., Mr. V. E. Negus: The Mechanism of the Larynx.

FELLOWSHIP OF MEDICINE AND POST-GRADUATE MEDICAL ASSOCIATION, 1, Wimpole-street, W. 1.

MONDAY, Feb. 11th, to SATURDAY, Feb. 16th.—Combined Course on Diseases of Children. Clinical Demonstrations and Lectures from 10 A.M. to 4.30 P.M. daily, including the ROYAL WATERLOO HOSPITAL, VICTORIA HOSPITAL FOR CHILDREN, and PADDINGTON GREEN CHILDREN'S HOSPITAL.—CENTRAL LONDON OPHTHALMIC HOSPITAL. Clinical Lecture Demonstration every afternoon. Mon., 2 P.M., Mr. Oliver. Tues., 2.30 P.M., Mr. Gibb. Wed., 2.30 P.M., Mr. Levy. Thurs., 2.30 P.M., Mr. Cunningham. Fri., 4.30 P.M., Mr. Williamson-Noble (Pathological).—LONDON LOCK HOSPITALS. Clinical Work daily; Lectures at Dean-street. Mon., 5 P.M., Mr. Gibbs: Treatment of Syphilis. Tues., 2.30 P.M., Mr. McDonagh: The Theory and Practice of the Treatment of Syphilis. Wed., 5 P.M., Mr. Juler: Syphilitic Affections of the Fundus Oculi. Thurs., 2.30 P.M., Mr. Corbett: Practical Demonstration of Tests used in Syphilis and Gonorrhœa. Fri., 4 P.M., Mr. Johnston Abraham: Late Sequelæ of Gonorrhœa in the Female.—LONDON SCHOOL OF TROPICAL MEDICINE. Tues. and Thurs., 2 P.M., Special Clinical Demonstrations. NORTH-EAST LONDON POST-GRADUATE COLLEGE (Prince of Wales's General Hospital), Tottenham. Special Intensive Course (Second Week).

WEST LONDON POST-GRADUATE COLLEGE, West London Hospital, Hammersmith, W.

MONDAY, Feb. 11th.—10 A.M., Surgical Registrar: Surgical Pathology. 12 noon, Mr. Simmonds: Applied Anatomy. 2.30 P.M., Mr. Addison: Surgical Wards.

TUESDAY.—10 A.M., Dr. Drummond Robinson: Gynæcological Operations and Wards. 12 noon, Dr. Burrell: Chest Cases. 2 P.M., Mr. Sinclair: Surgical Out-patients.

WEDNESDAY.—10 A.M., Dr. Saunders: Medical Diseases of Children. 12.15 P.M., Dr. Burnford: Medical Pathology. 2.30 P.M., Mr. Donald Armour: Surgical Wards.

THURSDAY.—10 A.M., Dr. Grainger Stewart: Neurological Dept. 11 A.M., Mr. Simson: Gynæcological Dept. 2 P.M., Dr. Scott Pinchin: Medical Out-patients.

FRIDAY.—10.30 A.M., Dr. Pritchard: Medical Wards. 2 P.M., Dr. Burrell: Medical Out-patients. 2 P.M., Mr. Banks-Davis: Throat, Nose, and Ear Dept.

SATURDAY.—9.30 A.M., Dr. Burnford: Bacterial Therapy Dept. 10 A.M., Dr. Saunders: Medical Diseases of Children. 10 A.M., Mr. Banks-Davis: Operations on Throat, Nose, and Ear.

Daily, 10 A.M. to 6 P.M., Saturdays, 10 A.M. to 1 P.M., In-patients, Out-patients, Operations, Special Departments.

NATIONAL HOSPITAL FOR THE PARALYSED AND EPILEPTIC, Queen-square, Bloomsbury, W.C. 1.

POST-GRADUATE COURSE: FEBRUARY–MARCH, 1924.
CLINICAL LECTURES AND DEMONSTRATIONS.

MONDAY, Feb. 11th.—2 P.M., Out-patient Clinic: Dr. Hinds Howell. 3.30 P.M., Epileptic Equivalents and Borderland Syndromes: Dr. Kinnier Wilson.

TUESDAY, Feb. 12th.—2 P.M., Out-patient Clinic: Dr. Grainger Stewart. 3.30 P.M., Cranial Nerve Palsies: Dr. Risien Russell.

THURSDAY, Feb. 14th.—2 P.M., Out-patient Clinic: Dr. Kinnier Wilson. 3.30 P.M., Polyneuritis: Dr. Gordon Holmes.

FRIDAY, Feb. 15th.—2 P.M., Out-patient Clinic: Dr. Gordon Holmes. 3.30 P.M., Recent Studies on the Vestibular Nerve: Mr. Sydney Scott.

COURSE OF LECTURES AND DEMONSTRATIONS ON THE PATHOLOGY OF THE NERVOUS SYSTEM.

MONDAY, Feb. 11th.—12 noon, Neurosyphilis. II.: Dr. J. G. Greenfield.

The Fee for the Course, including Pathology, is £5 5s. For those who hold Perpetual Tickets the fee is £3 3s.

COURSE OF LECTURES ON THE ANATOMY AND PHYSIOLOGY OF THE NERVOUS SYSTEM.

WEDNESDAY, Feb. 13th.—12 noon, Development; Units of Structure and Function.

THURSDAY, Feb. 14th.—12 noon, Spinal Cord; Anatomy; Intrinsic and Extrinsic Systems: Dr. Kinnier Wilson.

The Fee for this Course will be £2 2s.

Dr. F. M. R. Walshe will give a COURSE OF EIGHT CLINICAL DEMONSTRATIONS, CHIEFLY ON METHODS OF EXAMINATION OF THE NERVOUS SYSTEM, in the Wards at 10 A.M., every Wednesday and Thursday during February. The numbers attending the Course will be limited. Fee £2 2s.

COURSE OF LECTURES AND DEMONSTRATIONS ON THE NEUROLOGY OF THE EYES.

WEDNESDAY, Feb. 13th.—3.30 P.M., Papilloedema and Optic Neuritis: Mr. Leslie Paton.

The Fee for this Course alone is £5 5s. If taken in conjunction with the general Post-Graduate Course the fee is £3 3s. All applications should be sent to the Secretary, Medical School.

Mr. Armour and Mr. Sargent operate at the Hospital on Tuesday and Friday morning at 9 A.M., or at such other times as may be announced.

Any part of the Course may be taken separately. Special arrangements will be made for those unable to take the whole Course. Fees should be paid to the Secretary of the Hospital at the Office on entering for the Course.

J. G. GREENFIELD, Dean of Medical School.

ST. JOHN'S HOSPITAL, 49, Leicester-square, W.C.

TUESDAY, Feb. 12th.—5 P.M., Dr. Graham Little: Pityriasis Rosea.

THURSDAY.—5 P.M., Dr. J. L. Bunch: Tuberculosis.

UNIVERSITY COLLEGE, Gower-street, W.C.

FRIDAY, Feb. 15th.—5 P.M., Prof. J. Robertson: The Influence of Improved Town Planning and Housing in Public Health. (Last lecture.)

HOSPITAL FOR SICK CHILDREN, Great Ormond-street, W.C.

THURSDAY, Feb. 14th.—4 P.M., Mr. Doyne: Ophthalmia Neonatorum.

CANCER HOSPITAL, Kensington, S.W.

WEDNESDAY, Feb. 13th.—4.30 P.M., Dr. T. B. Vaile: Surgical Anæsthesia by Nitrous Oxide and Oxygen.

QUEEN CHARLOTTE'S LYING-IN HOSPITAL, Marylebone-road, N.W.

THURSDAY, Feb. 14th.—5 P.M., Mr. L. C. Rivett: The Value of Ante-natal Examination.

UNIVERSITY OF LIVERPOOL POST-GRADUATE LECTURES. (At 3.30 P.M.)

MONDAY, Feb. 11th.—(At the Children's Hospital.) Dr. Fordyce: Clinical and Pathological.

TUESDAY.—(At the Southern Hospital.) Dr. de Courcy: The Use of the Ophthalmoscope in General Practice.

WEDNESDAY.—(At the Northern Hospital.) Dr. M. Bligh: Empyema in Adults and Children.

THURSDAY.—(At the Stanley Hospital.) Miss Nicholson: Gonorrhœa in the Female.

FRIDAY.—(At the Royal Infirmary.) Dr. Buchanan: Medical Cases.

MANCHESTER ROYAL INFIRMARY POST-GRADUATE LECTURES.

MONDAY, Feb. 11th.—4.15 P.M., Mr. S. R. Wilson: Recent Improvements in Anæsthesia.

TUESDAY.—4.15 P.M., Sir William Milligan: Present Position of Labyrinthine Surgery.

MANCHESTER FRENCH HOSPITAL POST-GRADUATE LECTURES.

THURSDAY, Feb. 14th.—4.30 P.M., Mr. A. C. Magian: The Gynæcological Causes of Married Unhappiness.

UNIVERSITY OF SHEFFIELD POST-GRADUATE LECTURES.

TUESDAY, Feb. 12th.—(At the Royal Infirmary.) 3.30 P.M., Mr. Mouat: Common Disabilities of the Foot.

FRIDAY.—(At the Royal Hospital.) 3.30 P.M., Mr. Morrell: Radiology in the Diagnosis of Obscure Conditions. (Illustrated.)

SALFORD ROYAL HOSPITAL LECTURES.

THURSDAY, Feb. 14th.—4.30 P.M., Dr. H. T. Ashby: Rheumatism in Children.

ROYAL INSTITUTE OF PUBLIC HEALTH, 37, Russell-square, W.C.

WEDNESDAY, Feb. 13th.—4 P.M., Dr. P. C. Varrier-Jones: Settlements for Tuberculosis.

Appointments.

FORRESTER, A. T. W., M.D. Lond., has been appointed Medical Superintendent of the Warwick County and County Borough of Coventry Mental Hospital.

GOMPERTZ, R. H. C., M.B., B.S. Lond., Medical Referee under the Workmen's Compensation Act for the County Courts of Barnstaple, &c.

MILLER, J. R., M.B., Ch.B. St. And., Resident Medical Officer, Dumfries Royal Infirmary.
O'SULLIVAN, P. T., M.D., B.Ch.R.U.I., Professor of Medicine, University College, Cork.
TODD, A. H., M.S., B.Sc. Lond., F.R.C.S. Eng., Consultant in Orthopædic Surgery for the Royal Air Force, and Assistant Surgeon, The Royal Hospital, Richmond.
Manchester Royal Infirmary: KLETZ, N., M.B., Ch.B. Manch., M.R.C.P. Lond., Senior Medical Registrar; BROCKBANK, W., M.R.C.S., L.R.C.P.; BROADHURST, W., M.B., Ch.B.; and FAIRBROTHER, R. W., M.B., Ch.B., House Physicians. LAMBERT, V. F., M.B., Ch.B.; MORRIS, L., M.B., Ch.B.; BACON, W. B., M.B., Ch.B.; FILDES, W. E., M.B., Ch.B.; BROMLEY, J. F., M.B., Ch.B.; and EDWARDS, N. L., M.B., Ch.B., House Surgeons. GALLOWAY, R. L., M.B., Ch.B., second Surgical Registrar. RYRIE, B. J., M.B., Ch.B. (Senior), and HAWORTH, A., M.B., Ch.B. (Junior), Pathological Registrars. POSTON, Mrs. MARGARETTE McL., M.B., B.Ch., B.A.O., Anæsthetist (Central Branch). PATERSON, R. S., M.B., Ch.B., Senior Assistant Medical Officer to the Radiological Department.

Vacancies.

For further information refer to the advertisement columns.

Birmingham General Hospital— Director of V.D. Dept. £600.
Birmingham, Queen's Hospital.—Med. Reg. £100.
Birmingham Union, Dudley-road Hospital.—Res. P. £650.
Bristol Royal Infirmary.—H.P.'s, H.S.'s, Obst. H.S., Cas. and Ophth. H.S. Each £80. Also Dental H.S. £116.
Camberwell Infirmary.—Asst. Med. Supt. £500.
Carlisle, Cumberland Infirmary.—Res. M.O. £175.
Edinburgh Royal Mental Hospital.—Asst. P. £350.
Evelina Hospital for Children, Southwark, S.E.—P. to Out-patients.
Glamorgan County Mental Hospital, Bridgend.—Jun. A.M.O. £350.
Hampton, Middlesex, Infant Welfare Centre.—Female Medical Practitioner. £1 11s. 6d. per session.
Hospital for Epilepsy and Paralysis, Maida Vale, W.—Res. M.O. £150.
Kent County Ophthalmic Hospital, Maidstone.—H.S. £300.
Malay States.—M.O.'s. and Health O.'s. £616.
Manchester, St. Mary's Hospitals.—Res. Obstet. S. Res. S.O. Each £200. Also two H.S.'s. Each £50.
Manchester, Victoria Memorial Jewish Hospital.—Two additional Anæsthetists. 50 guineas, with 10s. 6d. per attendance.
Nottingham General Hospital.—Res. Cas. O. £250.
Royal Chest Hospital, City-road, E.C.—P. to Out-patients.
Royal Earlswood Institution, Redhill, Surrey.—Jun. Asst. M.O. £250.
Royal National Orthopædic Hospital, 234, Great Portland-street, W.—Three Hon. Anæsthetists.
St. Bartholomew's Hospital.—Refraction Asst. One guinea per session.
St. Luke's Hospital, Chelsea, S.W.—Third Asst. M.O. £325.
St. Marylebone Hospital, Ladbroke-grove, W.—Third A.M.O. £300.
Sudan Government, Medical Dept.—Medical Inspector. £E.720.
West London Hospital, Hammersmith-road, W.—Hon. Med. Reg., Hon. Surg. Reg., and Hon. Obstet. Reg.
Windsor, King Edward VII. Hospital.—Hon. Asst. P.
Worcester General Infirmary.—Res. M.O. £200.
The Chief Inspector of Factories, Home Office, London, S.W., announces a vacant appointment at Markfield, Leicestershire.

Births, Marriages, and Deaths.

BIRTHS.

DICKSON.—At a nursing home, London, on 30th Jan., to Ethel (née E. S. Grey), wife of Flight-Lieutenant E. D. Dalziel Dickson, M.B., Ch.B., F.R.C.S., R.A.F., Lime Tree House, Wendover, Bucks—a son.
DUNCAN.—On Jan. 29th, at Purulia, India, the wife of Major A. W. Duncan, I.M.S., of a daughter.
RAYNER.—On Feb. 3rd, at a nursing home, wife of Francis L. Rayner, 65, Hornsey-lane, N. 6, of a daughter.
SUTHERLAND.—On Jan. 30th, at a nursing home, the wife of Halliday G. Sutherland, M.D., Canynge-road, Clifton, of a son.

MARRIAGES.

KNOBEL—RINTOUL.—On Feb. 4th, in London, William Bernard Knobel, M.D., M.R.C.P., to Ellen, eldest daughter of Mr. and Mrs. George Rintoul, of Angers, France.

DEATHS.

DE MORGAN.—On Jan. 27th, at St. Leonards, Campbell William De Morgan, M.B., of Montagu House, Upper Norwood.
HARDCASTLE.—On Feb. 2nd, at Sydenham-terrace, Newcastle-on-Tyne, William Hardcastle, M.B. Lond., L.R.C.P., aged 51 years.
WHITE.—On Jan. 30th, at Cannes, Lieut.-Colonel Joshua Chaytor White, C.M.G., I.M.S. (retd.), aged 59.
WILKIN.—On Jan. 27th, at Rose Ash, North Devon, John Frederic Wilkin, M.D., aged 84.

N.B.—A fee of 7s. 6d. is charged for the insertion of Notices of Births, Marriages, and Deaths.

Notes, Comments, and Abstracts.

THE "LITTLE THINGS" IN DIAGNOSIS AND TREATMENT.[1]

BY ARCHIBALD YOUNG, M.B., C.M., B.Sc., F.R.F.P.S. GLASG.,
PROFESSOR OF SURGERY, ANDERSON COLLEGE OF MEDICINE, GLASGOW; DEAN OF THE COLLEGE; VISITING SURGEON, WESTERN INFIRMARY, GLASGOW, ETC.

I HAVE often been impressed by the importance of comparatively insignificant details in the construction of a clinical picture. I have often tried to impress on my students, and on my house surgeons, the importance of attention to detail, both in the examination of a case, and in the construction of a diagnosis, on the basis of the facts of a clinical history, and the ascertained facts of a carefully made examination. I have often found, for myself, both the value of trifles apt to be overlooked, in the making of a reliable and correct diagnosis, and—not seldom, I regret to say—the value that they *would* have had, if they had been given due weight, in the prevention of error in the making of a diagnosis. Only too often, I am sorry to say, have I myself been able to look back, after the event, on a case, wrongly, or at least incompletely diagnosed, and been able to see how, if only due attention had been given to some symptom or sign, and its importance properly appreciated, a very different diagnosis, possibly a very different prognosis, would have been given, and, perhaps, a very different—even more favourable—issue would have resulted.

The Pathognomonic Sign.

You have heard, I dare say, the term "pathognomonic" applied to a certain symptom, sign, or group of symptoms and signs in a given disease, and perhaps you may have been—as I was in my student days—somewhat unduly impressed by such a term. One of my old teachers used it a great deal. He spoke of a reversal of the pulse-respiration ratio as "pathognomonic" of pneumonia, of the serpiginous outline of a syphilitic ulcer as "pathognomonic," of the barrel-shaped chest as "pathognomonic" of emphysema, and so on. In many cases his diagnosis of such conditions was perfectly correct, and the signs referred to led to a just appreciation of the lesion present, but it soon became evident to me that a scientific diagnosis demanded much more than that.

The Syndrome.

Nowadays you must have heard many speak of such and such a "syndrome," meaning, by the term, a combination of symptoms and signs, which, taken together, are regarded as characteristic of some particular disease—some symptom-complex, which being present, and actually demonstrated, or demonstrable, points unerringly to the correct diagnosis. While it may be worth while to recognise such combinations, as indicating—even with considerable emphasis—the direction in which the correct diagnosis should be sought, there is some danger of our falling into much the same error that the use of the term "pathognomonic" was apt to lead to.

It may be conceded that certain symptoms and signs, or certain combinations of these, generally or even always occur in particular diseased conditions, but they are not always equally developed or evident; in come cases they may be obscured by other symptoms and signs. It is at least true to say that a too slavish adherence to the "pathognomonic," or to the "syndrome" idea is liable to lead to error, and it is equally true to say that it does not tend to the cultivation of the really scientific habit in construction of a clinical diagnosis.

Important Signs.

There are, however, many examples of symptoms or signs which furnish useful indications of the nature of the disease from which a patient is suffering. Take, for instance, the diagnostic significance of pain, local or referred, in all manner of conditions. Several years ago, when I had under my professional care a young girl on whom I operated for a very acute mastoiditis, the girl's father mentioned to me, quite casually, how his wife was much troubled by "rheumatic" pains in her shoulder, and that she was often simultaneously afflicted by so-called bilious attacks. I was not then being consulted professionally on the matter; I did, however, remark, even then, "What about gall-stones?" The husband reminded me of my remarks a year

[1] An abstract of a lecture delivered to the Queen Margaret Medical Club, Glasgow, on Nov. 19th, 1923.

later, when I was sent for to see his wife professionally. She had suffered much, meantime, and had been under the care of several physicians, having been labelled as suffering from panniculitis, rheumatism, neuritis, &c. She had had several courses of systematic massage, and no end of anti-rheumatic remedies. I saw her, found her slightly jaundiced, gave a diagnosis of gall-stones which proved correct, removed her gall-bladder and the gall-stones, and all her symptoms disappeared.

Or, take another example. Suppose you are confronted with a doubtful abdominal case, in which you are told that the bowels act with normal frequency. It is seldom advisable to accept, without personal verification, the assurance either of patient or of friends. A simple answer in the affirmative to the question, "Are the bowels all right?" should rarely be taken as sufficient. You must learn exactly how often the bowels act daily, weekly, &c., and of any growing difficulty or frequency, any accompanying pain, tenesmus, mucus or blood in the stools; you must see the stool for yourself. You will get many surprises, and, I am very certain, much valuable information. I have found an astonishing failure on the part of doctors, nurses, house surgeons, patients even, to prosecute properly this line of examination. In my wards I have no difficulty now—but at first I found it more difficult—to carry out a proper examination of the stools. My regular march to the bath-room to inspect the results of enemata has long ceased to furnish a theme for amusement, for we have had numerous examples of the valuable information to be obtained there.

One might multiply such examples almost indefinitely, but let these examples suffice for the purpose. I do not wish to dwell on these instances as suggesting the possibility of building a diagnosis on single, or even on a few, symptoms or signs—that would be, once again, our old "pathognomonic" sign—but I wish to emphasise the desirability of taking into consideration all the striking signs in constructing a clinical picture.

Signs in Eye Conditions.

I am indebted to Dr. Maitland Ramsay for the following note regarding particularly suggestive symptoms and signs in the diagnosis of different eye conditions:—

"Unconsidered trifles frequently missed by the unobservant, are often of great value, both in diagnosis and prognosis. Every branch of medicine furnishes examples, and these instances from ophthalmology may be of interest.

"A patient may complain, in an indefinite manner, of his sight, and of a feeling of discomfort in his eyes, but, at the time of examination no abnormal signs can be detected. Nevertheless, if that patient, in the course of conversation, says that, during the previous year, he has had to change his spectacles several times, and, in reply to an inquiry, admits that he has noticed, on many occasions, a rainbow-like halo round a lamplight, a diagnosis of glaucoma can be made without much hesitation.

"Or another patient, with the same general complaint of difficulty in seeing, so as to recognise a friend in the street, or to read a printed page, may state that, to him, blue has now become a predominant colour; that, for example, when he looks at a bunch of sweet peas, they all appear to be in different shades of blue, or, when in a theatre, the chorus girls all appear to be dressed in blue. In such a patient, careful testing will reveal, in all probability, a central scotoma for red and green, and a diagnosis of toxic amblyopia may be established quite readily, even although the ophthalmoscopic findings are negative. Such a patient, when his colour defect is pointed out, may then describe, if he be at all observant, how he has been struck, of late, when walking along the street, by the almost corpse-like pallor of the passers-by; or, if he is a golfer, he may admit the difficulty he has been having lately in distinguishing the red flags on the greens, while he can see the white flags with comparative ease; if he is a billiard player, he may confess that, in certain positions, he cannot see the red ball.

"Another patient may complain that, although he sees to read, he has difficulty in passing from one line to another, and is constantly losing his place. His friends, perhaps, have noticed that he only eats the food on one side of his plate, and that, if anyone approaches him from behind, say, from his left-hand side, he does not see the person. Almost certainly, that patient is suffering from hemianopia."

Dr. Maitland Ramsay also drew my attention to a note which appeared in THE LANCET of Oct. 20th, 1923, regarding an investigation being conducted in Leicester into the causes of "felting" of underwear. The writer of the note was reminded of "the late Sir William Osler's tale of the ailing child of wealthy parents; it was before the days of vitamins and a numerous flock of consultants stood baffled around the puling infant. At last an aged practitioner took the child's napkin, extracted it with water, and applied the guaiacum test. The test was positive and scurvy stood revealed." This story furnishes a good example of an "unconsidered trifle," appreciation of which might be productive of a good result.

Diagnosis and Prognosis.

The term diagnosis literally connotes "knowing through" or "through and through." Actually, we conceive it as involving the due consideration of every kind of evidence, the placing of each factor in its proper relation to all others, a correct appraisement of anatomical relations, the facts of known physiology and of pathology, and their importance in relation to a particular lesion. Ætiology, also, has come to have a greatly added importance in the making of any diagnosis. In the beginning of things medical, diagnosis was not given so restricted an application as we are apt to give it to-day; nor was there the same tendency to separate it from what we now speak of as prognosis. Or, rather, it might be more correct to say that prognosis, a more ancient term than diagnosis, had a much wider and more comprehensive scope. I have heard the late Sir William T. Gairdner emphasise the fact that Hippocrates meant by "prognosis" not merely "fore-knowledge," but also a process of talking of, or interpreting, the disease beforehand—prior, that is, to the patient's recounting of his symptoms. Thus the use of the word by Hippocrates was not exactly like our present-day application of it. The close association of prognosis with diagnosis has not only the warrant of antiquity, but the very obvious justification of logical connexion. The prognosis in any case of disease hinges largely on the accuracy and completeness of the diagnosis, and it is the prognosis that the patient, or his friends, chiefly want.

In the course of a recent conversation with Sir James Mackenzie, the latter took my breath away at one point, by suddenly saying, "What does diagnosis matter? It is of very little importance. What really matters is prognosis. Is the man going to die? When is he going to die? How is he going to die? Why is he going to die? How does cancer kill a man? Why do our cancer patients die? What is it that kills them? It's not the cancer. What is it?" And so on. There is obviously very much we have still to learn. There are very many problems still to be solved. And, probably most of these solutions, when achieved—if they ever are—will be reached, not as the result of any astounding discovery, but as the result of appreciating in their proper meaning, and in appraising at their proper value, sundry details—little things, unconsidered or imperfectly considered, whose importance has been missed.

Treatment.

There remains for consideration the aspect of the subject concerned with treatment. The good physician or surgeon, as a rule, pays most attention to the little details; treatment must be based upon a constant watchfulness of the patient's progress. A sudden, perhaps trifling, change for better or for worse, should not go unnoticed; its immediate, or, at least, its early recognition may count for a very great deal in the prospects of the sufferer. Observation is wanted just as much in treatment as in the making of a diagnosis, and changes occurring during treatment may greatly influence prognosis.

Suppose you are watching the progress of a case, and, for days, perhaps, things have been going badly. The patient not only seems to be getting steadily worse, but he may even seem to have given up the fight himself. The Vis medicatrix naturæ no longer shows any sign of effort after recovery. You go in to see him one morning, and you appreciate a change for the better at once. He has had a shave—a thing he had no idea of for, it may be, days before. In other ways as well he has begun to recover his self-respect—shall we say?—and he shows it. He is going to make a fight for it yet—you know it almost instinctively. Or, to take another example, suppose you have a critical abdominal case, and, spite of all treatment, medical or surgical, improvement tarries. You find, some day, that the tongue, previously dry and brown and cracked, has begun to clean, and has become moist, and, probably you very soon find other evidences of improvement, such as disappearance of tympanites, cessation of vomiting, relief of nausea, return of desire for food, lessening of thirst. Your outlook for the patient is at once affected for the better.

A complete reversal of either of the pictures I have just described would, on the other hand, require to be given corresponding weight.

One aspect of the problem of little things is that which deals not so much with the cure of the patient, in the usual acceptation of the term, as with the *care* of the patient. To a weak and helpless patient, whose bodily powers are already much below par, the most trifling ills or discomforts

are apt to be magnified greatly, and their individual as well as their combined and cumulative effect may go far to turn the scale towards a less favourable result than might otherwise be looked for. A crumb, a crease in the sheet, a slight unevenness in the mattress, a noise, uncontrolled light, a buzzing and persistent fly, disordered bedclothes, too hot or too cold a water-bottle, a harsh word from an attendant, a slip-shod serving of a meal, may have great influence for evil upon the prognosis. On the other hand, one can hardly over-estimate the good effect that may be exerted by the reverse conditions. Here comes in the value of efficient nursing; the efficient nurse is faithful in small things as in great.

And the efficient doctor is the one who, with a good scientific equipment, can combine fidelity in observation and unremitting attention to the daily care of his patient, with the gift of sympathetic realisation of his patient's aches and pains. I have known great surgeons, and celebrated physicians, who were utterly incapable of "caring for" their patients, being devoid of sympathy, ignorant of the many simple devices or remedies which can accomplish so much in the way of imparting added comfort, and intolerant of peevishness or fretfulness.

I can never be too thankful for the good fortune which brought me, at a certain stage of my professional career, into contact with a man, endowed with many gifts, whose greatest achievement was in the after-care of his patients. From him I learned how to deal with such disturbing factors as flatulence, thirst, digestive defects contingent on many surgical conditions, the after-care of abdominal operations, preparations for an operation of any kind, special details in the preliminary preparations for rectal operations, and so on. I learned how much the average patient came to lean on his own doctor; how he appreciated consistent personal care; how he resents, in many cases, his being relegated to the care, soon after operation, of an assistant or nurse, however skilled and attentive. I have come to realise, since, how much the patient counts it for good that the surgeon himself shall dress his wound.

In what I have just said I have been concerned to emphasise the fact that the actual treatment of the patient is something far transcending the removal or eradication of the disease from which he is suffering. The art of medicine is a big thing indeed; viewed solely from the therapeutic point of view, it is big enough. None the less true is it however, to say that the "little things" count for very much, if not, in fact, to remove dis-ease, at least to make dis-ease more bearable, or less unbearable. The sympathetic touch, the gentle word, the watchful eye, are more than mere figments of imagination, mere interesting details used by the sentimentalist in writing of the rôle a good nurse and a good physician or surgeon may aspire to fill. The larger issues, the great principles, the immutable laws remain; what I have here presented is but a fragment, a side issue, an aspect of study, a little bundle of comments from experience.

SMOKE ABATEMENT.

A BOOK on Smoke Abatement[1] appears opportunely at a time when, as Dr. Cyril Banks, medical officer of health of Halifax, points out in a foreword, there appears to be a revival of public interest in the problem of a pure air-supply. The author aims at giving sanitary inspectors and public health officials a proper understanding of the sequence of events in a furnace, and of the fundamental principles involved in the use of the various instruments and appliances designed to secure complete combustion and to prevent unnecessary smoke. This object has been attained in a satisfactory manner, and the numerous illustrations contribute valuable assistance thereto. All interested in the subject will agree with Mr. Clinch that it is a pity that stoking has hitherto been regarded as an unskilled trade. Untrained inspectors are the logical sequel. One of the hopeful suggestions in the book is that, if the inspector knows his work, the stokers are only too willing to learn from him. If we are to do any good in this matter of industrial smoke prevention we must have skilful stokers and well-trained smoke inspectors. Let us hope that the enthusiasm aroused by the clean air of our industrial towns during the coal strike will not be damped down by the specious plea that the smoke from the domestic chimney, owing to the lower temperature at which it is given off, is more injurious than the smoke from the factory chimney. We want to reduce both varieties to a minimum. Mr. Clinch seems to think that an Englishman's love of an open fire is incurable, and pins his faith to low-temperature coke as a remedy for domestic smoke. We fancy, however, that the need for labour-saving in these days has converted a good many lifelong fire-pokers to the use of gas. Mr. Clinch's book ought to help to keep alive interest in this important problem, and will be of value, not only to public health workers, but also to mill-owners and managers and all who have an interest in the proper management of factory chimneys.

[1] The Smoke Inspector's Handbook or Economic Smoke Abatement. By Herbert G. Clinch, Chief Smoke Inspector, Halifax. London: H. K. Lewis and Co., Ltd. 1923. With 59 illustrations. Pp. 136. 7*s.* 6*d.*

WOOLLEN UNDERWEAR AND BODY BELTS.

A NUMBER of garments, together with samples of materials used by Messrs. Lyle and Scott, Ltd., of Hawick, in the manufacture of underwear, including body belts for adults and children, have been submitted to us for examination. The specimens comprised bleached and "natural" fabrics of varying qualities. They were soft, well woven, and a microscopic examination showed that the fibres of all the specimens responded to the tests for pure wool. It is a matter of importance in the case of articles for use next to the skin that when claiming to be wool they should consist of this material and nothing else.

PHYSICAL ENERGY.

IN an entertaining little book Bombardier Billy Wells (London: T. Werner Laurie, Ltd. 1923. Pp. 153. 3*s.* 6*d.*) sets out to show how physical and mental energy may be developed by the practice of boxing. By itself, the book would not be particularly interesting, but coupled with the name of its distinguished author, it at once attracts attention. Physical energy is largely the gift of the gods; books may teach us how to conserve it, but it must exist before it can be trained, and essays on physical energy may be as useful (or useless) to the listless as advertisements of hair culture are to the bald. But though it is doubtful if readers of this book will gain much physical energy from a study of the author's views, they will find much of interest in his many personal touches. The intention of this book is to show how boxing may become a rational method of physical culture. The boxer is contrasted with the purely muscular weight-lifter, the latter being likened to an elephant, the former to a Derby winner. In this connexion two interesting sculptures are reproduced. The first is that of "Physical Energy," by G. F. Watts, showing a mounted equestrian; the second is that of "The Farnese Hercules," whose massive muscles would do credit to a Shire horse. It is stated in the preface that this book has been written in collaboration with an eminent medical authority, and a reference to the last chapter on spinal nerve pressure raises the suspicion that the "eminent medical authority" is greatly intrigued by the modern teachings of osteopathy. The reader is informed that "if one of the vertebræ should become even slightly displaced, the channel is narrowed and the nerve within it is pressed upon, causing a great variety of symptoms accompanied by disturbance of one or more of the bodily organs." Pathology of this stamp is not impressive, but the Bombardier's reminiscences of his steps up the ladder of fame are worth reading.

HEALTH CONDITIONS IN BECHUANALAND.

Mr. J. Ellenberger, Government Secretary, in his report on the affairs of the Protectorate for the year 1922, states that the returns of diseases among the European and native populations show a low degree of incidence and severity all round. The prevalent diseases have been malaria, with its complications and sequelæ, syphilis, and influenza. With regard to malaria, there was during the year a remarkable absence of outbreaks affecting entire communities or areas. The total returns represent a collection of infrequent and mild individual cases scattered over a wide extent of territory. There has been a marked increase in the return of venereal diseases. This is, however, more an indication of extended observation, as connected with the special work of the dispensaries provided for the purpose, than of absolute increase. The influenza outbreaks were mild and of the ordinary catarrhal type, most of the cases recovering after a week or ten days. Epidemics of measles, unattended by any special features of severity or mortality, occurred at Serowe and elsewhere. The total number of cases, both indoor and outdoor, treated during the year was 1700, with, so far as ascertainable, a mortality of 1·06 per cent. The total rainfall for the year ended March 31st, 1923, was 23·192 inches. The Protectorate is bounded on the south and east by the Union of South Africa, on the north-east by Southern Rhodesia, on the north by the Zambezi and Clobe Rivers, and on the west by the territory of South-West Africa. It has not been surveyed as a whole, but its area is estimated at 275,000 square miles. It lies roughly at between 2000 and 5000 feet above sea level, and only a few people live at the cooler altitudes of from 4000 to 5000 feet. The portion of the country inhabited by the greater number of both Europeans and natives is adjacent to the only line of railway, which passes through the eastern side of the Protectorate for a distance of 403 miles.